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A Preliminary Floristic Survey of the Benthic Marine Algae of Rotuma Island

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Abstract

A preliminary study of the intertidal benthic macroalgal flora of the island of Rotuma (12°30′S 177°05′E; politically attached to the Fiji Island group) has revealed a total of 88 taxa, including 41 Rhodophyceae, 11 Phaeophyceae and 36 Chlorophyceae, representing the first published records of marine algae for this island. Of these, 30 represent new records for the Fijian flora. The Rotuman flora is distinct from that of Fiji, a probable consequence of habitat limitations and high exposure regimes on Rotuman reefs that have led to a predominance of low-profile, robust algal species. A distinct north–south distribution pattern was found, brought about by variations in exposure regimes. Biogeographic considerations further dissociated the Rotuman and Fijian floras, the former being more equatorial and in the path of oceanic currents dispersing algal species from donor areas in the central and western Pacific.

Introduction

The tropical Pacific Ocean, including areas between approximately 30°N and 30°S, is a rich and varied habitat for algae (Hoek 1984) but has only been studied phycologically fairly recently. Indeed, most phycological study has taken place in temperate regions, and the tropics, particularly the South Pacific and tropical regions of the Indian Ocean, have been the subject of relatively few investigations.

In working with tropical Pacific algae, the main limitation is the lack of a comprehensive flora for the region, as well as the lack of generally available and accurately identified herbarium collections. At present, South Pacific algae are held in scattered herbaria, including the Bernice P. Bishop Museum at the State Museum for Natural and Cultural History of Hawaii (BISH); the University of Hawaii (UH); the Department of Botany at the University of Auckland; the British Museum (BM) and the University of California at Berkeley (UC). A steadily growing collection of tropical algae recently has been deposited at the South Pacific Regional Herbarium at the University of the South Pacific, Suva, Fiji (SUVA). There is a conspicuous absence of monographs on most of the tropical algal genera, and one has to look for information in widely scattered publications, many of which are not illustrated, or consist of incomplete checklists. Among the few monographs are those of *Halimeda* (Hillis-Colinvaux 1959), *Polysiphonia* (Hollenberg 1968*a*, 1968*b*), and *Codium* (Silva 1960).

The knowledge of algal floras of islands in the tropical Pacific is of great importance, firstly from a biogeographic point of view. The world can be divided into a number of regions as defined by their temperature regimes, and these latitudinal boundaries often (but not always) coincide with floristic boundaries, as particular species of algae each have their own range of water-temperature tolerances (Hoek 1984). Comparisons between floras of different isolated islands within the same phytogeographic boundaries enable one to extrapolate possible dispersal routes and patterns for algae from their presumed Indo-Pacific

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centre of origin, which may be linked to e.g. ocean currents or artificial dispersal agents. This knowledge can in turn broaden our appreciation of world-wide algal distribution patterns over geological time. Also, endemism rates can indicate evolutionary rates of algal species. Secondly, the study of algal distribution patterns on islands can yield useful information about the state of the particular reef systems they are associated with. Tropical reefs are very delicate and balanced ecological systems, exhibiting surprising productivity in otherwise nutrient-poor tropical oceanic waters. Peculiar macro-algal distribution patterns (e.g. sudden algal blooms) often reflect damaged or polluted reef environments. Phycological knowledge is therefore one of the essential prerequisites when undertaking such activities as environmental impact assessments or other baseline ecological surveys. Thirdly, there is an intrinsic value in any inventory of a new flora, as it contributes to a documentation of the world's biota.

Rotuma Island is the most northerly island in the Fijian Island group and has been neglected in surveys of the Fijian algal flora. Few aspects of the island have received any scientific attention. Snow (1969) published a bibliography of Fiji, Tonga and Rotuma which includes several historical, sociological, and scientific entries for Rotuma. To the author's knowledge, however, no phycological survey of the algal flora of the island has yet been undertaken, despite fairly extensive surveys of nearby Fiji. The only previous records of Rotuman algae that could be traced by the author are two collections of *Meristotheca* by W. E. Booth in October, 1975 and August, 1977, housed in the phycological herbarium at the Bernice P. Bishop Museum, Honolulu, Hawaii (F. M. Norris, pers. comm.).

Owing to its isolation from the rest of the Fiji group (and for that matter any other island group), it could be expected that there might be noticeable differences in the macroalgal species composition and distribution of that island. Being 6° north of Fiji, Rotuma also possesses a more equatorial climate than the remainder of the island group, leading to interesting speculations about floristic comparisons with the rest of Fiji and the Pacific in general. In addition, the fringing Rotuman reefs are essentially non-polluted, and a study of these could offer a useful means of comparison with other reef systems in the region. In order to address some of the above questions, it was decided to conduct a phycological survey of Rotuma and compile a preliminary checklist, as well as to make observations on the local habitats, species composition and distributions, and ecological interactions on the island's reefs and other marine habitats.

Historical Background

The earliest reports of marine benthic algae from the Fijian island group were by Grunow (1874), who listed 37 species from Ovalau. In 1876, Dickie listed nine species, including four new records, from the same locality. Askenasy (1888) published a list of 10 species from Matuku Island collected during the H.M.S. 'Gazelle' Expeditions. It was almost 85 years later before Chapman (1971) published a checklist of some 79 species for Fiji, to which he added a further 17 in 1977. Further additions to the Fijian flora were published by Kapraun and Bowden (1978), and the early history of algal collecting in Fiji, together with biogeographic and ecological aspects, was reviewed by McRaild (1978). Five years later, Booth *et al.* (1983) made some preliminary attempts at culturing *Eucheuma striatum* in Fiji. In 1984, Itono and Ajisaka published taxonomic notes on the Fijian marine algae, while Itono (1985*a*, 1985*b*) described some Fijian Rhodophyta. In 1984, Kraft documented a deep-water form of *Callophycus serratus* from Fiji. The most detailed recent reports of Fiji algae have been by Kasahara (1985, 1988), who studied collections made by two Kagoshima Maru Expeditions to Fiji in 1982 as part of a scientific survey of the South Pacific by Kagoshima University in Japan, as well as extensive collections that he made on Viti Levu. Kasahara's 1985 thesis listed 76 Chlorophyta and Rhodophyta (including 37 new records), while his profusely illustrated 1988 report listed 43 Chlorophyta. Unfortunately, he did not publish his Phaeophyta collections, although duplicates were donated to the South Pacific Regional Herbarium and are awaiting identification. In 1991, Garbary *et al.* listed many new distribution records for Fijian algae (82 species listed, based on collections made in August 1980, August 1981 and February 1982). Later that same year, South (1991) published a

checklist of marine benthic algae from Dravuni Island, in the Astrolabe Reef region, listing a total of 71 species, 5 of which were new records for Fiji. South (1992) also published an illustrated catalogue of the *Halimeda* species reported from Fiji, and in 1993 reported on the edible seaweeds of these islands. The most comprehensive overview of Fijian algae to date is the 1992 checklist by South and Kasahara, listing a total of 314 species including 11 Cyanophyceae, 99 Chlorophyceae, 36 Phaeophyceae and 168 Rhodophyceae. Since then, further additions to the flora were made by a number of researchers (Raj 1993; South 1993; South and N'Yeurt 1993; South *et al.* 1993; N'Yeurt *et al.* 1995, 1996*a*, 1996*b*), bringing the total Fijian macroalgal flora (including Rotuma) to 422 taxa. In addition, recent visits by D. S., and M. M. Littler, from the Smithsonian Institution in Washington, DC., to the Great Astrolabe Reef, Kadavu, have yielded many new records of benthic algae that await publication. However, most of the Fijian algal flora is still poorly known, as much of the Lau Group, Kadavu, Lomaiviti Group, Yasawas, Taveuni and Vanua Levu have yet to be investigated in detail.

Materials and Methods

Field Survey Methods

An initial survey of the island was carried out, from January to May 1992. A further survey was conducted from December 1992 to February 1993, with additional specimens collected between September 1993 and January 1994, and between November 1994 and January 1995.

A preliminary visual survey of the coastline was carried out, and 19 representative sites around the island were chosen for inspection (Fig. 1). Surveys were carried out either by wading or snorkelling. Considering the sparse distribution of the algae, and the turbulent and exposed conditions on the often very narrow fringing reefs, it was deemed impractical to lay transects. Instead, the area was visually inspected for algal growth, with salient distribution and reef profile features being recorded on an underwater writing board. Owing to the exposed nature of the reefs and the lack of diving facilities and trained partners, it was considered dangerous to sample subtidal habitats. Consequently, all collections were from the intertidal region, imposing obvious limitations on the overall results obtained.

Photographs of algae *in situ* and of the general habitats were taken using an Olympus 35 mm camera and a Pentax SLR variable-focus camera. Algal specimens were hand-collected or scraped off the substratum using a knife, put into polyethylene plastic bags or vials, promptly preserved in 5% formaldehyde in seawater, and stored in light-proof plastic containers for eventual shipment back to Fiji.

Laboratory Methods

Hand-sections or freezing-microtome sections were made for general observation of internal anatomy. Slides were stained with either crystal violet or 1% acidified aniline blue, and made permanent if necessary by embedding in glycerine jelly (Drury *et al.* 1967) following impregnation of the material in 50% glycerol water solution for 2–3 h. Slides were examined using a Zeiss compound microscope. A camera-lucida attachment (Abbé Drawing Tube, Carl Zeiss) was used to make pencil drawings of the specimens. Observations on larger specimens and general sorting of the collections were performed using a Labova dissecting microscope. Slides are housed in the South Pacific Regional Herbarium in a numbered series prefixed by 'S' (slide).

Voucher specimens of larger algae were first dried using an algal press, then mounted onto herbarium paper. Specimens were deposited into the South Pacific Regional Herbarium housed at the University of the South Pacific in Suva. Collection numbers are preceded by 'USP'. Ektachromes and black-and-white photographs of identified algae were obtained in the laboratory, either using formalin-preserved or pressed specimens. Macrophotography was undertaken with a Nikon F2A using a 55 mm 1:3.5 lens, and a ring flash (Sunpak GX8R ring flash attachment, Sunpak Corporation, Tokyo, Japan) in conjunction with Kodak EC100 (Ektachromes) or Kodak PX125 (Black-and-white) film. Photomicrographs were taken with a Zeiss Photoscope III (*/ S = slide collections. Accession numbers refer to specimens housed at the Phycological Herbarium, South Pacific Regional Herbarium, The University of the South Pacific (SUVA) and are preceded by 'USP' to distinguish them from the angiosperm collection).

Taxonomy and Nomenclature

Nomenclature used in identification of the algae follows that of Silva *et al.* (1987) unless stated otherwise. The lists of Tsuda and Wray (1977) and of Dawson (1954, 1956, 1957) were used as references for the region. Taylor's Bikini atoll flora (1950) was also widely used, as were Womersley and Bailey's (1970) Solomon Islands list, Tsuda and Garrigue's (1988) New Caledonia list, Payri and

Meinesz's (1985) Polynesia checklist and South and Kasahara's (1992) Fiji checklist. Price and Scott's recent (1992) handbook on Australian Great Barrier Reef turf Rhodophyta proved to be a very useful visual and descriptive guide to many genera and species, as were Millar and Kraft's (1993, 1994) catalogues of New South Wales algae. A number of other papers and books dealing with floras of the tropical Pacific and comparable areas elsewhere in the world were also used, such as Kasahara's (1985) thesis on Fijian Benthic Algae; Dawson's (1953–1963) Marine Red Algae of Pacific Mexico, Taylor's (1960) 'Algae of the Tropical Coast of the Americas', Lucas' (1935) Algae of Lord Howe Island, Chapman's (1955) paper on Funafuti algae, Jaasund's (1976) Marine Algae of Tanzania and the Littler *et al.* (1989) Caribbean algae handbook, as well as numerous other scattered papers which are referred to as the need arises in the species description section of this survey. It is to be emphasised, however, that for all literature cited it is assumed that the identifications upon which these records are based are correct. This reservation is especially necessary in dealing with Pacific algae, where names for temperate species are often used that are subsequently found to have been wrongly applied.

Study Site

Physiography

The island of Rotuma (12°29'S and 177°05'E) is situated about 465 km north-west of Cikobia, the northern-most island in the Fiji group. It is fairly isolated from other island groups in the central South Pacific (Fig. 2). Rotuma lies in a general depth of 3.7 km on a plateau that includes the Tongan and Fiji groups. The island itself, however, is a totally separate basaltic shield volcano edifice of late Pleistocene age (about 0.2 Ma) situated on a 200 km^2 submarine bank of Pleistocene or earlier limestone which in turn lies over a former volcanic edifice of Tertiary age (Woodhall 1987). The submarine bank (remnants of a former atoll) results in fairly shallow coastal waters (37–46 m) seaward of the fringing reef (Fiji Ministry of Agriculture and Fisheries 1983). There are no real lagoons, although in two places (Maka Bay and Hapmafau Bay) there are shallow areas of relatively calm waters inside a reef approaching the barrier class.

The island is of more recent volcanic origin than the nearby Fiji group, which dates from the late Eocene (Menard and Hamilton 1963). The most recent Rotuman lavas are about 15000 years old, and the island has a basaltic rocky core covered with rich volcanic soil (Gardiner 1898). Occupying about 44 km^2, the main island is about 14.5 km long and 4.5 km wide at its largest point. It is surrounded by nine small islets (Fig. 3), five of which occur on the surrounding reef (Hauati'u; Hauamea'me'a; Solnohu; Solkope; Afgaha). Of the remaining four, two have no reefs (Uea (77 ha; 262 m high; cliff-bound); Hofliua (< 1 km^2; 58 m high; volcanic; cliff-bound)) and the rest (Hatana (4 ha; 18.3 m high; volcanic); Hofhavunglola (small islet)) share the same reef platform. They are important nesting sites for seabirds (Booby (*Sula* sp.); Noddy Tern (*Anous* sp.)). The coastline is about 39.6 km long and backs a reef area estimated to be about 16 km^2. The majority of the reef is fringing, with a maximum width of 1.5 km at Noa'tau on the eastern coast and a minimum of less than 100 m wide between Halafa and Maftoa, and Losa and 'Anmosega Point. The highest peak (on Uea Island) reaches about 262 m. There are no real rivers on the island, although two perennial streams occur on Uea Island. A small stream flowing from the crater of the Solele cone has carved a shallow valley 10–15 m deep west of Motusa (Woodhall 1987). Rotuma consists of two distinct parts (east and west) joined by a narrow, sandy, vegetated isthmus at Motusa (possibly human-made over an intervening reef, according to Rotuman tradition supported by geological data (Gardiner 1898; Woodhall 1987)). An extensive submerged sand and coral bank extends approximately 8 km from Malhaha towards the north-west, and a submarine bank (Whale Bank) approximately 5 × 1.5 km with a mean depth of 30–33 m lies to the west (Fiji Ministry of Agriculture and Fisheries 1983).

A noticeable feature of the island is its remarkably regular U-shaped range of hills (Fig. 4), which reaches a maximum elevation of 262 m. The hills either have a flat depression at the top or rise into a ridge, although one (Mt Satarua) has characters of both (Gardiner 1898). The soil at the foot of these hills is extremely rich and arable, which accounts for the Rotuman custom of locating plantations on hill slopes. Everywhere there are medium to large blocks of a very vesicular lava, which among other things are used by Rotumans to make the ubiquitous pig fences around the island. There are about 14 coastal villages circling the island, with a total population of approximately 3000. Most of the surrounding islets are volcanic in origin, and while they have a gentle slope towards the mainland, their seaward face often consists of precipitous cliffs above a narrow fringing reef 10–20 m broad (e.g. Hauatia Island). Freshwater seeps on the beach from the underground water table occur in numerous places around the coast.

There are no large marine swamps or coastal mangroves on Rotuma, although shallow subtidal seagrass beds (*Syringodium isoetifolium* (Ascherson) Dandy) exist at one site (Maka Bay). The only mangroves on the island are found at Paptea on the east coast, although the small swamp is located close to pig sties about 300 m inland and consists of *Bruguiera gymnorhiza* trees intermixed with coconut palms (*Cocos nucifera*) and other vegetation. The water level can rise up to 30 cm at high tide, and the substratum is sandy to muddy. Seawater appears to seep in underneath the intervening village

and road to reach the swamp, which occurs in depressions at or below sea-level. This observation seems to contradict an earlier report by Dunlap and Singh (1980) that mangroves do not occur on Rotuma, although perhaps the authors were referring only to coastal mangrove habitats.

The island is 6° north of Fiji and is noticeably warmer. July temperatures rarely drop below 25°C, and daytime temperatures can rise up to 35°C. Water temperature ranges from 26–32°C (pers. obs.). The prevailing winds are east to south except during December, January, February and March, in these months, they vary from north to west (Gardiner 1898). A west-north-west current at approximately 1 kph surrounds the island (Fiji Ministry of Agriculture and Fisheries 1983). Rain is frequent and regular (weekly; about 3550 mm yr^{-1}; Woodhall 1987) and hence droughts are uncommon. Hurricanes which normally hit neighbouring Fiji every 3 years or so rarely affect Rotuma, the last major hurricane to hit the island being Bebe in 1972 which caused widespread destruction.

Reef Structure

The reefs are in most cases fringing except in two places (Maka and Hapmafau Bays), where they approach the barrier class and enclose a shallow lagoon. The reefs are between 100–1500 m wide and can be quite exposed at low tide, drying between 0.6 to 1.5 m at each new and full moons (when tidal ranges are greatest). There are no mudflats or coastal marine mangrove areas on Rotuma, but Maka Bay has extensive seagrass beds of *Syringodium isoetifolium* and a somewhat muddier substratum owing to its lagoon and relative protection from wave action leading to sediment accumulation. At the other extreme, Lopta reef is probably the narrowest on the island, being only 60–100 m wide in places and considerably exposed. Consequently, algal habitats in the various Rotuman reefs differ according to their extent and degree of exposure. Among the main constituents of the reefs are *Acropora* spp., except at Maka Bay and 'Ahau where brittle *Pavona decussata* Dana rubble is dominant. The latter species of coral forms an almost continuous pavement on the outer reef at Maka Bay.

Dominant Species

A distinct north–south disjunct of algal distribution was observed on the island, chiefly a result of the different habitats on opposite coasts (fairly deep and sandy on the north, more rocky and exposed at low tide in the south). Typical and dominant northern species include a wide range of *Halimeda* and *Caulerpa* spp., and widespread plants of *Melanamansia glomerata* that inhabit rubble of *Acropora* sp. on reefs from Mea to Oinafa. In the south, however, only one species of *Halimeda* (*H. opuntia*) was dominant, the rest of the species being chiefly small rhodophytes (*Heterosiphonia,* Ceramiales such as *Herposiphonia*) although the larger red alga, *Meristotheca procumbens*, was fairly abundant on the south-west coast. The eastern and western stations exhibited characters from both northern and southern habitats. The two small lagoons on the island had characteristic floras associated with their relatively calm waters. Maka Bay on the north coast was dominated by *Sargassum polycystum*, *Rhodymenia divaricata*, *Laurencia* sp., *Gracilaria* sp., and *Enteromorpha flexuosa*; while Hapmafau Bay on the south of the Motusa isthmus was dominated by *Caulerpa racemosa*, *Caulerpa serrulata* and *Chlorodesmis major.*

Systematics

Chlorophyceae

Ulvales

Ulvaceae

Enteromorpha Link in Nees 1820

Enteromorpha flexuosa (Wulfen) J. Agardh 1883: 126; Taylor 1960: 61; Bliding 1963: 73, figs 38–40; Womersley and Bailey 1970: 261; Dawes 1974: 67; Ngan and Price 1979: 4; Dong and Tseng 1984: 254, pl. 126, fig. 2; Koeman 1985: 166, figs 106–130; Lewis 1987: 4; Santelices and Abbott 1987: 5; Silva *et al.* 1987: 92; Littler *et al.* 1989: 22; Tsuda 1991: 42, Millar and Kraft 1994*b*: 422

Conferva flexuosa Roth 1800: 188 (type locality: Duino, near Trieste, Adriatic Sea).

Ulva flexuosa Wulfen 1803: 1 (*nomen novum*).

Enteromorpha intestinalis (Linnaeus) Link var. *tubulosa* Kützing 1845: 247 (type locality: freshwater, Germany).

Enteromorpha tubulosa (Kützing) Kützing 1856: 11, pl. 32, fig. II; Dawson 1954: 384, fig. 6*a, b*; 1957: 101; Tsuda and Wray 1977: 97; Dong and Tseng 1984: 256, pl. 127, fig. 2; Payri and Meinesz 1985*a*: 509; Abbott 1989: 225.

Enteromorpha intestinalis (Linnaeus) Link f. *tubulosa* (Kützing) V.J. Chapman 1937: 229.

Enteromorpha intermedia Bliding 1955: 262, figs 1–5 (syntype localities: various in northern Europe, USA).

(Fig. 16)

Plants light-green and fleecy, sparsely branched 150–155 μm in diameter, up to 20 cm long. Cells angular, subrectangular up to 25 × 35 μm, arranged in distinct longitudinal rows. No pyrenoids seen in specimens collected (perhaps due to formalin preservation). Lateral branches often monofilamentous, 25–30 μm in diameter.

Distribution

Cosmopolitan.

Fijian Records

Kapraun and Bowden 1978: 200; South and Kasahara 1992: 47.

Rotuman Distribution

Maka Bay (MAK13/ USP 451).

Habitat and Remarks

Found abundantly within seagrass beds in the bay, in relatively shallow (50–60 cm) and warm (30–33°C) waters. The fleecy masses of this alga are often intermingled with *Sargassum polycystum* and other brown and red algae which are abundantly found at this site. The high water temperatures and obvious fertility of this area in the Maka Bay may explain the absence of pyrenoids in the *Enteromorpha* collected, as food products may not need to be stored in this situation.

Conferva flexuosa Roth, the intended basionym of *Enteromorpha flexuosa* (Wulfen) J. Agardh is a later homonym of *C. flexuosa* O.F. Müller 1782: 5, pl. 882 and hence does not have priority. *Ulva flexuosa* Wulfen is treated as a *nomen novum* in accordance with Article 72, Note 1 of the ICBN (see Silva *et al.* 1987: 92).

Cladophorales

Cladophoraceae

Cladophora Kützing 1843

Cladophora conferta P. Crouan et H. Crouan in Schramm and Mazé 1865: 37 (type locality: Guadeloupe) van den Hoek 1982: 173, figs 332–354; Silva *et al.* 1987: 97.

Cladophora uncinata Børgesen 1913: 20, figs 9, 10 (type locality: St Croix, Virgin Island). The synonymy was proposed by van den Hoek (1982: 174).

(Fig. 8)

Thallus dark green, 5–10 cm high forming dense compact clumps. Axes non-percurrent, pseudodichotomously–trichotomously branched. Segments 70–112 μm in diameter, with branches laterally inserted with a steeply inclined cross-wall. Ultimate branches with rounded apices, 70–75 μm in diameter. Length:width ratio of main axes (5–6). Plants remains dark dull-green after drying.

Distribution

Fiji, tropical Atlantic (Bermuda, Caicos Is., Jamaica, Puerto Rico, Guadeloupe, Venezuela, Trinidad, Curaçao, Ghana).

Fijian Record

New record for Fiji.

Rotuman Distribution

Jölmea (Hapmak) (J1/ USP 440, J5/ USP S6: 10, J6/ USP S6: 11).

Habitat and Remarks

Found growing as compact masses at the bottom of a natural hole 50 cm in diameter and about 1 m deep on the outer reef; exposed to the air at low tide. The plants were a good match for the species described by van den Hoek (1982).

Rhizoclonium Kützing 1843

Key to the Rotuman Species of *Rhizoclonium*

1. Filaments 45–82 μm in diameter ..... *R. africanum*
1: Filaments 250–320 μm in diameter ..... *R. grande*

Rhizoclonium africanum Kützing 1853: 21, pl. 67, fig. II (type locality: 'Senegambien' (Senegal or Gambia)); Womersley and Bailey 1970: 265; Lewis 1987: 15; Silva *et al.* 1987: 99.

Rhizoclonium samoense Setchell 1924: 177, fig. 42 (syntype locality: Tutuila Island, Samoa)-Dawson 1956: 33, fig. 13*a*; Trono 1968: 164; Tsuda and Wray 1977: 99; Payri and Meinesz 1985*a*: 510.

Rhizoclonium hookeri Kützing (misapplied name *fide* Womersley and Bailey 1970: 265)Weber-van Bosse 1913*a*: 85; 1926: 79; Taylor 1960: 77; Chapman 1961: 74, fig. 80; Valet 1968: 34; Dawes 1974: 90; Lewis 1987: 15; Santelices and Abbott 1987: 5; Garrigue and Tsuda 1988: 60; Yoshida *et al.* 1990: 272.

(Figs 10, 17)

Filaments light to yellowish green, forming entangled fleecy masses. Individual filaments 45–82 μm in diameter, the cell walls 17–26 μm thick and stratified. Individual cells 2(–4) times as long as wide.

Distribution

Fiji, Caroline Island, Marshall Island, New Caledonia, Samoa, Solomon Island, Tahiti, Easter Island, Philippines, northern Australia, Japan, Jamaica, north-west Africa.

Fijian Record

New record for Fiji.

Rotuman Distribution

Hapmafau (HAP44/USP 448); widespread around the coast.

Habitat and Remarks

Attached to rocks and tree roots in the uppermost intertidal. The nomenclature followed for this species is that of Womersley and Bailey (1970: 265), who synonymised *Rhizoclonium samoense* Setchell with *R. africanum* Kützing after examination of the respective type specimens. The Rotuman plants agree well with *R. africanum* as described by Womersley and Bailey (1970: 265) as regards filament diameter (40–80 μm for

R. africanum; 45–82 μm for the Rotuman specimens) and cell length:width ratio. However, in view of the divergent interpretations of *Rhizoclonium* taxonomy (Womersley and Bailey 1970; Nienhuis 1975), it is evident that further study of this genus is necessary in order to clarify its distribution and nomenclatural status.

Rhizoclonium grande Børgesen 1935: 14, figs 5,6 (type locality: Bombay, India); Jaasund 1976: 5, fig. 12; Silva *et al.* 1987: 99; Tsuda 1991: 43.

(Figs 9, 20)

Filaments bright-green, 250–320 μm in diameter, creeping, with thick stratified cell walls. Rhizoids abundant, up to 100 μm thick at the base, arising from nearly every cell. Individual cells 2–3 times as long as wide.

Distribution

Fiji, Philippines, Japan, Tanzania.

Fijian Record

New record for Fiji.

Rotuman Distribution

Hapmafau (*HAP48/ USP S4: 4, *HAP49/ USP S4: 5).

Habitat and Remarks

Intermingled with small red algae within *Valonia aegagropila* carpets covering exposed rock platforms.

Siphonocladales

Boodleaceae

Boodlea Murray et De Toni 1890

Boodlea coacta (Dickie) Murray et De Toni in Murray 1889: 245, pl. 49; Valet 1968: 39; Tsuda and Wray 1977: 93; Lewis 1987: 6; Lewis and Norris 1987: 10; Silva *et al.* 1987: 100; Garrigue and Tsuda 1988: 56; Tsuda 1991: 40; South and Yen 1992: 127.

Cladophora coacta Dickie 1876*b*: 451 (type locality: 'Osima Harbour' (O-Shima, Wakayama Prefecture, Japan)).

(Fig. 19)

Grows as light green spongy, crispy hemispherical tufts 25–30 mm across. Main filaments about 240 μm in diameter, composed of cells 500–560 μm long. Branching irregularly lateral, the terminal branchlets 35–65 μm in diameter. One-celled haptera interconnecting branchlets in all planes; branches and cells of fairly uniform size.

Distribution

Fiji, Japan, Taiwan, northern Australia, Micronesia, Nauru, Solomon Islands, New Caledonia.

Fijian Record

New record for Fiji.

Rotuman Distribution

Present at most sites. Representative material: Lopta (*L25, *L26/ USP S6: 6, L34/ USP 420, *L47/ USP S7: 4).

Habitat and Remarks

Back reef, found in tidal pools attached to coral rubble or occupying cavities in *Acropora* heads.

Struvea Sonder 1845

Struvea anastomosans (Harvey) Piccone et Grunow ex Piccone 1884: 20; Børgesen 1913: 54, Fig. 39; Taylor 1928; Egerod 1952: 359, pl. 31, fig. 4; Dawson 1954: 390, fig. 8*g*; Dawson 1956: 30; 1957: 103; Chapman 1955: 355; Taylor 1960: 122, pl. 15, fig. 1; pl. 19, fig. 2; Chapman 1960: 93, fig. 106; Trono 1968: 162; Womersley and Bailey 1970: 270; Tsuda and Wray 1977: 100; Ngan and Price 1979: 5; Dong and Tseng 1984: 276, pl. 137, fig. 2; Payri and Meinesz 1985*a*: 510; Heijs 1987: 147; Lewis 1987: 7; Lewis and Norris 1987: 10; Silva *et al.* 1987: 101; Abbott 1989: 225; Tsuda 1991: 43; Wynne 1993: 20.

Cladophora? anastomosans Harvey 1859: pl. CI (type locality: Fremantle, Western Australia).

Struvea delicatula Kützing 1866: 1, pl. 2, figs *e–g* (type locality: New Caledonia); Okamura 1908(1907–1909): 203, pl. 40, figs 9–12; Reinbold in Weber-van Bosse 1913: 65; Gilbert 1961: 421; Valet 1968: 37; Tsuda and Wray 1977: 100; Lewis 1987: 7; Lewis and Norris 1987: 10; Garrigue and Tsuda 1988: 61.

(Figs 21, 22)

Plants densely entangled, thallus up to 15 mm long and 8 mm broad; main axis filamentous and up to 440 μm in diameter, segmented in upper portions of stalk with c. 3–5 pairs of opposite cross-walled branchlet filaments 60–100 μm in diameter.

Distribution

Fiji, Micronesia, Tuvalu, Solomon Islands, Papua New Guinea, Australia, Hawaii, Taiwan, Philippines, China, Jamaica, Maldives.

Fijian Records

Chapman 1971: 165 (as *S. delicatula* Kützing); Kapraun and Bowden 1978: 200, fig. 33; South and Kasahara 1992: 48.

Rotuman Distribution

Present at most sites. Representative material: *Hapmafau* (*HAP34/USP S6: 8, *HAP35/USP S6: 9).

Habitat and Remarks

Occurs in tide pools, in sheltered back reef locations.

Siphonocladaceae

Boergesenia J. Feldmann 1938

Boergesenia forbesii (Harvey) J. Feldmann 1938: 1503, figs 3–5; Dawson 1954: 388, fig. 8*d*; 1957: 102; Gilbert 1961: 420; Taylor 1966: 347; Trono 1968: 157, pl. 17, fig. 7; Valet 1968: 37; Womersley and Bailey 1970: 268; Jaasund 1976: 15, fig. 31; Tsuda and Wray 1977: 93; Dong and Tseng 1984: 272, pl. 135, fig. 3; Payri and Meinesz 1985*a*: 507;

Trono 1986: 211, fig. 4; Lewis 1987: 9; Lewis and Norris 1987: 10; Silva *et al.* 1987: 100; Garrigue and Tsuda 1988: 56; Tsuda 1991: 40; Coppejans and Prud'homme van Reine 1992*a*: 171; Verheij and Prud'homme van Reine 1993: 144; Millar and Kraft 1994*b*: 431.

Valonia forbesii Harvey 1860: 333, fig. 8*d* (syntype localities: Ryukyu-retto, Japan; Sri Lanka); Lucas 1935: 197; Yamada and Tanaka 1938: 54; Taylor 1950: 41.

(Fig. 14)

Plants bright-green, clavate, turgid, and filled with fluid when fresh; obovoid 1–4 cm long and up to 1 cm broad, aggregated in groups of 5–10 individuals. Lower portion a tapered base c. 3 mm long, with basal rhizoidal attachments.

Distribution

Tropical oceans.

Fijian Records

Chapman 1971: 165; Kasahara 1985: 32; 1988; South 1991: 4; South and Kasahara 1992: 48.

Rotuman Distribution

Hapmafau (HAP17/USP 334, HAP18/USP 335).

Habitat and Remarks

Found on the sandy back reef in sheltered locations. Sometimes forming extensive colonies 1–3 m from the beach, as at Fapufa.

Cladophoropsis Børgesen 1905

Cladophoropsis sundanensis Reinbold 1905: 147 (syntype localities: 'Timor; Laut', Indonesia); Weber-van Bosse 1913*a*: 77, fig. 18; Børgesen 1934: 8; 1935: 10, fig. 1; 1940: 21; Gilbert 1946: 77; Dawson 1956: 30, fig. 8; 1957: 102; Gilbert 1961: 424; Womersley and Bailey 1970: 268; Jaasund 1976: 11, fig. 24; Tsuda and Wray 1977: 96; Dong and Tseng 1984: 274, pl. 136 fig. 1; Payri and Meinesz 1985*a*: 509; Lewis 1987: 10 (*'sudanensis'*); Santelices and Abbott 1987: 5; Silva *et al.* 1987: 101; Tsuda 1991: 41; Coppejans and Prud'homme van Reine 1992*a*: 171; Wynne 1993: 20.

(Fig. 11)

Plants tufted, greenish-brown, up to 15 mm high with filaments 60–176 μm in diameter; loosely branched with branchlets at 300–500 μm intervals along the main axis. Branches non-septate and entangled at the base, secund or irregular and projecting from the distal end of the primary axial cells.

Distribution

Fiji, Micronesia, Tahiti, Solomon Islands, Easter Island, northern Australia, China, Maldives, Tanzania.

Fijian Record

Raj 1993: 55.

Rotuman Distribution

Fapufa (*F6/ USP S4: 6), Hapmafau (*HAP36/ USP S7: 7), 'Ahau (A1/ USP 447, *A5/ USP S3: 12).

Habitat and Remarks

Plants form small mats or clumps in sheltered tidal pools (Fapufa, Hapmafau), where filaments reach 100 μm in diameter; or coarser forms in tufts to 15 mm high infiltrated with calcareous mud and sand, composed of sometimes laterally anastomosing filaments up to 176 μm in diameter (at 'Ahau, where it is the dominant algal cover on coral debris along the shoreline).

The Rotuman specimens at 'Ahau closely fit the habitat description by Taylor (1950: 44), who most probably refers to this species under *C. zollingeri* (Kützing) Børgesen, as his Bikini specimens attain up to 175 μm in diameter. The type specimen of *C. zollingeri* has filaments in the range of 215–315 μm in diameter, in contrast to the filaments of *C. sundanensis* which range from 60–175 μm in diameter (see Howe 1914; Dawson 1956: 31).

Valoniaceae

Dictyosphaeria Decaisne ex Endlicher 1843

Dictyosphaeria cavernosa (Forsskål) Børgesen 1932: 2, pl. 1, fig. 1; Setchell 1935: 261; Yamada and Tanaka 1938: 54; Gilbert 1946: 77; Taylor 1950: 43, pl. 27, fig. 2; Egerod 1952: 350, figs 1*b–f*, 2*f–g*; Dawson 1954: 388, fig. 8*i*; Chapman 1955: 355; Dawson 1956: 29; 1957: 102; Moul 1957: 42; Levring 1960: 121; Taylor 1960: 116, pl. 7, fig. 5; Chapman 1961: 98, fig. 114*a, b*; Durairatnam 1961: 29; Gilbert 1961: 417; Meñez 1961: 48; Tsuda 1964: 6; Taylor 1966: 348; Trono 1968: 157; Tsuda and Trono 1968: 194; Valet 1968: 35; Womersley and Bailey 1970: 267; Jaasund 1976: 15, fig. 32; Tsuda 1976*b*: 328; Woelkerling 1976: 96, Fig. 45; Tsuda and Wray 1977: 96; Magruder and Hunt 1979: 27; Dong and Tseng 1984: 268, pl. 133, fig. 5; Payri and Meinesz 1985*a*: 509; Trono 1986: 212, fig. 5; Lewis 1987: 7; Lewis and Norris 1987: 10; Silva *et al.* 1987: 101; Garrigue and Tsuda 1988: 59; Abbott 1989: 225; Littler *et al.* 1989: 62; Tsuda 1991: 42; Coppejans and Prud'homme van Reine 1992*a*: 171; Ohba and Enomoto 1992: 28; South and Yen 1992: 127; Verheij and Prud'homme van Reine 1993: 144; Millar and Kraft 1994*b*: 431.

Ulva cavernosa Forsskål 1775: 187 (syntype localities: 'Gomfodae' (Al-Qunfidha), Saudi Arabia; Mokha, Yemen).

Valonia favulosa C. Agardh 1822*a*: 432 (type locality: 'Ravak' (Lawak); Waigeo Island, Moluccas, Indonesia).

Dictyosphaeria favulosa (C. Agardh) Decaisne ex Endlicher 1843: 18; Dickie 1876: 244; Okamura 1908(1907–1909): 205, pl. 40, figs 13–204; Lucas 1935: 196; Lewis 1987: 7.

(Fig. 12)

Plants green, sessile, c. 2–5 cm in diameter; sometimes spherical and often irregularly lobed. Thallus hollow, the walls 1 cell thick, with angular or polygonal cells clearly seen with the naked eye. Lightly attached to substratum via small rhizoids.

Distribution

Tropical oceans.

Fijian Records

Chapman 1971: 165 (as *D. favulosa* (C. Agardh) Decaisne); Kapraun and Bowden 1978; Kasahara 1985: 34; 1988; South and Kasahara 1992: 48.

Rotuman Distribution

Common at all sites. Representative material: Hapmafau (L39/ USP 418); Lopta (L33/ USP 419, L40/ USP 480).

Habitat and Remarks

Found in sheltered back reef sites, often underneath flat coral rubble and in tide pools.

Valonia C. Agardh 1822

Valonia aegagropila C. Agardh 1822*a*: 429 (lectotype locality: Venezia, Italy *fide* Egerod 1952: 348); J. Agardh 1887: 99; Weber-van Bosse 1913*a*: 60; Taylor 1950: 41; Egerod 1952: 348, pl. 29*b*; Dawson 1954: 388, fig. 8*j*; Chapman 1955: 355; Dawson 1956: 28; 1957: 101; Moul 1957: 44; Levring 1960: 121; Taylor 1960: 111, pl. 17, fig. 6; Chapman 1961: 98, fig. 111; Gilbert 1961: 418; Tsuda 1964: 7; Taylor 1966: 347; Trono 1968: 156; 1986: 212, fig. 6; Womersley and Bailey 1970: 266; Jaasund 1976: 15, fig. 29; Taylor 1977: 8; Tsuda and Wray 1977: 100; Magruder and Hunt 1979: 33; Ngan and Price 1979: 5; Dong and Tseng 1984: 270, pl. 134, fig. 3; Lewis 1987: 8; Lewis and Norris 1987: 11; Silva *et al.* 1987: 102; Olsen and West 1988: 104, fig. 6; Abbott 1989: 225; Littler *et al.* 1989: 58; Tsuda 1991: 44; Coppejans and Prud'homme van Reine 1992*a*: 171; Ohba and Enomoto 1992: 28; South and Yen 1992: 127; Verheij and Prud'homme van Reine 1993: 145, pl. 8, fig. 3.

(Fig. 15*a*, *b*)

Thallus encrusting, dark to light olive-green, composed of vesicle-like subclavate segments 3–13 mm long and 2–5 mm broad, subdichotomously branched from the sides or the ends of the cells. Young plants attached to each other, the older ones more or less free. Can form thick encrusting mats up to 10 mm thick over many m^2 of back reef rocks.

Distribution

Tropical oceans.

Fijian Records

Kapraun and Bowden 1978: 200; Kasahara 1985: 35, pl. 5, fig. 3; 1988; South and Kasahara 1992: 48.

Rotuman Distribution

Hapmafau (HAP22/ USP 343, HAP23/ USP 344).

Habitat and Remarks

Smaller specimens (1–2 mm long) form extremely dense encrusting mats on exposed beach rocks in backreef sites (eg. Hapmafau). The *Valonia* mats are typically covered with dark green Cyanophyceae (*Lyngbya* sp.) and offer a micro-habitat for a large variety of smaller red, green and blue-green algae (e.g. *Heterosiphonia*, *Cladophora*, *Ceramium*). The larger plants (3–5 mm long) are typically found in more or less free clusters at the base of rocks and coral rubble in sandy back reef sites.

Ventricaria Olsen et West 1988

Ventricaria ventricosa (J. Agardh) Olsen et West 1988: 104; Garrigue and Tsuda 1988: 61; Littler *et al.* 1989: 56; Tsuda 1991: 44 (as *Ventricularia ventricosa*); Coppejans and Prud'homme van Reine 1992*a*: 172; Ohba and Enomoto 1992: 28; Verheij and Prud'homme van Reine 1993: 146; Wynne 1993: 21.

Valonia ventricosa J. Agardh 1887: 96 (syntype localities: St. Croix, Virgin Island; Guadeloupe); Okamura 1936(1933–1942): 32, fig. 13; Egerod 1952: 347, pl. 29*a*; Dawson 1954: 388, fig. 8*e*; Dawson 1956: 28; 1957: 101; Chapman 1955: 355; Levring 1960: 121; Taylor 1960: 110, pl. 9, figs 4–5; 1966: 347; Chapman 1961: 95, fig. 109; Meñez 1961: 48; Trono 1968: 155; Valet 1968: 35; Womersley and Bailey 1970: 267; Dawes 1974: 92;

Jaasund 1976: 13, fig. 27; Woelkerling 1976: 100, fig. 65; Chapman 1977: 161; Tsuda and Wray 1977: 100; Magruder and Hunt 1979: 35; Dong and Tseng 1984: 272, pl. 135, fig. 1; Payri and Meinesz 1985*a*: 510; Trono 1986: 213, fig. 7; Lewis 1987: 8; Santelices and Abbott 1987: 5; Silva *et al.* 1987: 103; Abbott 1989: 225.

(Fig. 23)

Plants coenocytic and thin-walled dark green in colour, subsperical, up to 25 mm in diameter. Grows solitarily or in groups of 3 or 4; attached basally to the substratum by minute rhizoids.

Distribution

Tropical oceans.

Fijian Records

Chapman 1971: 165 (as *Valonia ventricosa* J. Agardh); Kasahara 1985: 36; 1988 (as *Valonia ventricosa* J. Agardh); South 1991: 4; South and Kasahara 1992: 49.

Rotuman Distribution

Hofëa (H221/ USP 345).

Habitat and Remarks

Plants occur on back reef, under flat pieces of coral rubble.

Bryopsidales

Bryopsidaceae

Bryopsis Lamouroux 1809

Key to the Rotuman Species of *Bryopsis*

1. Plants not tufted, in compact clumps 12–20 mm high; branchlets in a pair of offset lateral rows on one side of the primary axis ..... *B. harveyana*
1: Plants tufted, in lax clumps to 6 cm tall; branchlets in 2 opposite rows along central axis ..... *B. plumosa*

Bryopsis harveyana J. Agardh 1887: 82; Okamura 1931: 100; Yamada and Tanaka 1938: 60; Børgesen 1946: 36, Fig. 13; Tsuda and Wray 1977: 94; Dong and Tseng 1984: 280, pl. 139, fig. 1; Payri and Meinesz 1985*a*: 507; Lewis and Norris 1987: 10; Garrigue and Tsuda 1988: 57; Tsuda 1991: 40.

Bryopsis plumosa var. *secunda* Harvey 1858: 31, pl. 45A, figs 1–3 (type locality: Friendly Islands, *fide* J. Agardh 1887: 22).

(Fig. 48)

Thallus dark iridescent green; in compact clumps 12–20 mm high and 15 mm broad; main axis 195–200 μm in diameter and unbranched, with slight upward curvature. Secondary branches cylindrical to clavate, up to 1000 μm long and 85 μm broad, with rounded apex and slight constriction (35–41 μm) at base. Branchlets occurring in an offset pair of lateral rows on one side of the primary axis, giving a uniseriate appearance to the thallus. Secondary branchlets typically longer in middle of axis, imparting a renoid curvature to the younger blades.

Distribution

Fiji, New Caledonia, Tahiti, Ryukyu Islands, Taiwan, China.

Fijian Records

Kasahara 1985: 31, pl. 4, fig. 6; pl. 14, fig. *f*; 1988; South 1991: 5; South and Kasahara 1992: 49.

Rotuman Distribution

Maka Bay, Lopta (L14/ USP 336, *L32/ USP S6: 19).

Habitat and Remarks

Found as small isolated clumps on the outer reef crest, subject to heavy wave action. Strongly attached to rocks via rhizoids.

Bryopsis plumosa (Hudson) C. Agardh 1822*a*: 448; Harvey 1846: pl. 3; Kützing 1856: 29, fig. 83; Dickie 1874; Børgesen 1913: 20; Lucas 1935: 198; Taylor 1960: 131, pl. 9, fig. 11; Chapman 1961: 132, fig. 153; Dawes 1974: 73; Kermarrec 1974: 21, pl.1, fig. A; Rietema 1975: 8–24, pls 1–9; Haritonidis and Tsekos 1976: 278; Woelkerling 1976: 86, figs 9–14; Tsuda and Wray 1977: 94; Dong and Tseng 1984: 280, pl. 139, fig. 2; Womersley 1984: 282, figs 96*C*, 97*A*; Lewis 1987: 17; Lewis and Norris 1987: 10; Silva *et al.* 1987: 103; Garrigue and Tsuda 1988: 57; Littler *et al.* 1989: 30; Lee *et al.* 1991: 24, figs 1*A–E*, 4*A*; Tsuda 1991: 40; Verheij and Prud'homme van Reine 1993: 117; Millar and Kraft 1994*b*: 424.

Ulva plumosa Hudson 1762: 571 (type locality: Exmouth, Devonshire, England).

Bryopsis arbuscula Murray 1889.

(Figs 49, 60)

Plants erect and tufted, up to 6 cm tall, translucent olive-green with bluish iridescence on main branch axes, composed of fine plumose branchlets in 2 opposite rows along a central axis 175–178 μm thick. Lateral branchlets to 110 μm in diameter and 2–2.5 mm broad, obtuse at apex, with secondary branchlets 35 μm at centre and constricted (29–30 μm) at base. Main axis of plants naked below, with basal rhizoids, above pyramidally branched.

Distribution

New Caledonia, Micronesia, Lord Howe Island, Australia, Philippines, Ryukyu Island, China, Taiwan, Korea, Jamaica, tropical Americas, England, France, Greece, Italy, Netherlands.

Fijian Record

New record for Fiji.

Rotuman Distribution

Hapmafau (HAP19/ USP 337, HAP20/ USP 338, *HAP28/ USP S6: 17, *HAP37/ USP S6: 18).

Habitat and Remarks

Found attached to rocky platforms on back reef at Hapmafau, typically occupying small surge channels in association with tufts of superficially similar-looking plants of *Chlorodesmis hildebrandtii*; however, the *Bryopsis* plants can be distinguished by the bluish iridescence along their main axes.

Caulerpaceae

Caulerpa Lamouroux 1809: 136

Key to the Rotuman Species of *Caulerpa*

(Adapted in part from South and N'Yeurt 1993)

1. Branchlets usually stalked, the ends generally sharply swollen 6
1: Branchlets not stalked, ends not swollen 2–5
2. Assimilators flattened or compressed, not spirally twisted ..... *C. cupressoides*
2: Assimilators angular to compressed, spirally twisted ..... *C. serrulata*
3. Assimilators spirally twisted, marginal teeth about twice as long as broad ..... *C. serrulata* var. *typica* f. *serrulata*
3: Assimilators straight or only slightly spirally twisted, marginal teeth shorter than broad ..... *C. serrulata* var. *boryana* f. *occidentalis*
4. Axes not dichotomous, branchlets not distichous ..... *C. cupressoides*
4: Assimilators dichotomous, nearly all distichous ..... *C. cupressoides* var. *lycopodium* f. *elegans*
5. Plants large, sparingly branched; assimilators in several ranks ..... *C. cupressoides* var. *typica* f. *lycopodium*
5: Plants small, branching bushy, assimilators arranged in 5 or more ranks ..... *C. cupressoides* var. *mamillosa*
6. Ends of branchlets terminating abruptly in a peltate disk, or with trumpet-shaped branchlets with concave, flattened ends 7
6: Ends of branchlets generally swollen, varying from nearly cylindrical to clavate, subspherical or terminally flattened 8
7. Ends of branchlets terminating abruptly in a peltate disk, plants small; branchlets few ..... *C. racemosa* var. *peltata*
7: Ends of branchlets trumpet-shaped, flattened, plants larger, branchlets moderately to densely radially arranged ..... *C. racemosa* var. *turbinata*
8. Branchlets 20–30 mm high, not corpulent; ends of branchlets subspherical and inflated, 2–4 mm in diameter, laxly beset about foliar axis ..... *C. racemosa* var. *clavifera*
8: Branchlets 10–20 mm high, corpulent; ends of branchlets club to trumpet-shaped, 1–2 mm in diameter, compact, very densely beset about foliar axis ..... *C. racemosa* var. *uvifera*

Caulerpa cupressoides (Vahl) C. Agardh 1823: 441; Okamura 1923: 194, pl. 200, fig. 2 (as var. *typica*); Yamada and Tanaka 1938: 61 (var. *typica*); S. Yamada 1940; Chapman 1955: 355 (var. *typica*); Taylor 1960: 146, pl. 14, figs 3, 4, Fig. 6; pl. 15, figs 1–4; pl. 18, figs 11–13; 1966; Chapman 1961: 142, fig. 167 (var. *typica*); Durairatnam 1961: 28; Trono 1968: 170, pl. 14, fig. 8, pl. 15, fig. 3; Womersley and Bailey 1970: 274; Dawes 1974: 74; Taylor 1977: 4; Tsuda and Wray 1977: 94; Meñez and Calumpong 1982: 6, pl. 1, figs *B, C*; Dong and Tseng 1984: 280, pl. 139, fig. 4; Trono 1986: 214, fig. 9; Silva *et al.* 1987: 104; Garrigue and Tsuda 1988: 57; Littler *et al.* 1989: 48; Coppejans and Beeckman 1990: 113, figs 3–7; Tsuda 1991: 40; Coppejans 1992: 389, fig. 1*C*; Coppejans and Prud'homme van Reine 1992*a*: 172; Coppejans and Prud'homme van Reine 1992*b*: 676, fig. 2*A*, 8*A*; South and Yen 1992: 127; Verheij and Prud'homme van Reine 1993: 121, pl. 1, fig. 2.

Fucus cupressoides Vahl 1802: 38 (type locality: St Croix, Virgin Islands).

(Fig. 24)

Plants forming dense aggregations, with a smooth spreading stolon up to 30 cm long and 3 mm in diameter, anchored by numerous rhizoid-bearing branches spaced at close (0.5–1 cm) intervals. Foliar axes up to 4 cm tall, often strongly forked with sub-dichotomous branching. Ramelli oppositely pinnate and terete, with upward curving tendency, tapering to a sharp point at the tip, and generally twice as long as the diameter of the supporting axis. The ramelli usually arranged in ranks of 3s, sometimes 2s or up to 5.

Fijian Records

Chapman 1977: 161; Kasahara 1988; South 1991: 5; South and Kasahara 1992: 49; South and N'Yeurt 1993: 112, fig. 7.

Caulerpa cupressoides (Vahl) C. Agardh var. ***typica*** f. ***lycopodium*** (J. Agardh) Weber-van Bosse 1898: 335, pl. 27 figs 8–13; pl. 28, figs 10–12, fig. 14; Taylor 1960: 147, pl. 14, fig. 3; Chapman 1961: 145 (f. *typica* Weber-van Bosse); Payri and Meinesz 1985*a*: 507; Lewis 1987: 21; Silva *et al.* 1987: 105; Garrigue and Tsuda 1988: 57; Littler *et al.* 1989: 48; Coppejans and Prud'homme van Reine 1992*a*: 173.

Caulerpa lycopodium J. Agardh 1847: 6 (syntype localities: Brazil; West Indies).

(Fig. 33)

Erect axes up to 4 cm tall, spaced at relatively wide (2–3 cm) intervals along spreading stolon. The ramelli usually in ranks of 3s, sometimes 2s, oppositely pinnate with mucronate, upward-curving branchlets up to 1 mm long.

Distribution

Fiji, New Caledonia, Tahiti, northern Australia, Philippines, Indonesia, Jamaica, tropical Americas.

Fijian Records

Chapman 1971: 166; Kasahara (*in Herb.* Kyoto University, Faculty of Agriculture); South 1992: 5; South and Kasahara 1992: 49; South and N'Yeurt 1993: 114, fig. 8.

Rotuman Distribution

Hapmafau (HAP10/ USP 359, HAP15/ USP 360)

Habitat and Remarks

Found growing in back reef areas at Hapmafau. Usually attached to vertical faces of rocky platforms that are subject to a fair amount of wave action, and occurs together with other species of *Caulerpa* as well as *Chlorodesmis major* and *Halimeda opuntia* clumps.

Caulerpa cupressoides (Vahl) C. Agardh var. ***lycopodium*** (J. Agardh) Weber-van Bosse) f. ***elegans*** (P. Crouan and H. Crouan) Weber-van Bosse 1898: 336, pl. 27, figs 8, 9; Okamura 1923: 194, pl. 200, fig. 3; Taylor 1960: 148, pl. 15, figs 2, 3; Payri and Meinesz 1985*a*: 507; Silva *et al.* 1987: 105; Coppejans 1992: 391, fig. 1*A*; Coppejans and Prud'homme van Reine 1992*a*: 173; 1992*b*: 679, fig. 2*E*, 11*A*; South and N'Yeurt 1993: 115, fig. 11.

Caulerpa plumaris (Forsskål) C. Agardh var. *elegans* P. Crouan et H. Crouan in Schramm and Mazé 1865: 39 (type locality: Guadeloupe).

(Figs 26, 34)

Plants relatively small, the spreading stolon about 1 mm in diameter and vivid green in colour, even after drying. The foliar axes occur at 0.5–1 cm intervals along the creeping stolon, strongly forked with the distance between sub-dichotomies as little as 2 mm in the upper parts of the plant. The ramelli thin, oppositely pinnate and in ranks of 2 along a relatively broad (0.8–1 mm) central axis. The branchlets mucronate with apiculate, upward curving tips.

Distribution

Fiji, Tahiti, Papua New Guinea, Philippines, Indonesia, tropical Americas.

Fijian Record

New record for Fiji.

Rotuman Distribution

Hapmafau (HAP9/ USP 361).

Habitat and Remarks

Found growing in intimate association with var. *typica* in back reef areas at Hapmafau. Quite rare, but conspicuous by its more fragile looking habit and vivid green colour.

Caulerpa cupressoides (Vahl) C. Agardh var. ***mamillosa*** (Montagne) Weber-van Bosse 1898: 332, pl. 28, figs 2–7 (syntype localities: Galega and Manga-Reva Islands, Solomon Islands); Børgesen 1907: 368, fig. 13; 1913: 135, fig. 108; Setchell 1935: 261, pls 11–15; Levring 1960: 122; Taylor 1960: 148, pl. 15, fig. 4; pl. 18, fig. 11; Chapman 1961: 144, fig. 169; Womersley and Bailey 1970: 275; Payri and Meinesz 1985*a*: 507; Coppejans 1992: 391; Coppejans and Prud'homme van Reine 1992*a*: 173; 1992*b*: 679, fig. 3*A*, 8*B*; Millar and Kraft 1994*b*: 436.

Caulerpa mamillosa Montagne 1838.

(Figs 25, 35)

Plants stout and bushy, erect foliar axes closely spaced at 0.5–1 cm intervals along a relatively thick spreading stolon up to 2.5 mm in diameter. The foliar axes several times forked very early from the base, bearing mucronate, obvoid to subnavicular ramelli in several ranks.

Distribution

Fiji, Solomon Islands, Tahiti, Papua New Guinea, Indonesia, Jamaica, tropical Americas.

Fijian Record

South and N'Yeurt 1993: 116, fig. 10.

Rotuman Distribution

Hapmafau (HAP14/ USP 362, HAP16/ USP 363).

Habitat and Remarks

Found on vertical rocky platforms in back reef locations at a lower level than other *Caulerpa* species. Plants are conspicuous by their stout appearance and bushy habit.

Caulerpa racemosa (Forsskål) J. Agardh 1873: 35; Lucas 1935: 199; Gilbert 1946: 78; Egerod 1952: 369; Taylor 1960: 151, pl. 17, figs 1, 3, 4, 6, 7; pl. 18, figs 2–5, fig. 7; Chapman 1961: 145; Meñez 1961: 51; Taylor 1966: 350; Trono 1968: 171, pl. 14, fig. 9, pl. 16, fig. 7; Dawes 1974: 77, fig. 32; Tsuda 1976*b*: 327; Chapman 1977: 161; Taylor 1977: 8; Tsuda and Wray 1977: 95; Meñez and Calumpong 1982: 7; Payri and Meinesz 1985*a*: 507; Trono 1986: 217, fig. 13; Lewis 1987: 22; Lewis and Norris 1987: 9; Silva *et al.* 1987: 106; Garrigue and Tsuda 1988: 57; Abbott 1989: 226; Coppejans and Beeckman 1989: 384; Coppejans 1992: 401, figs 4*C–D*; Coppejans and Prud'homme van Reine 1992*b*: 698, figs 18*A–B*; Littler *et al.* 1989: 44; Tsuda 1991: 41; South and Yen 1992: 127 (var. *macrophysa*); Verheij and Prud'homme van Reine 1993: 122, pl. 1, figs 8, 9, pl. 2, figs 1–6; Millar and Kraft 1994*b*: 439.

Fucus racemosa Forsskål 1775: 191 (type locality: Suez, Egypt).

(Figs 28, 36)

Fijian Records

Kasahara 1988; South 1991: 5; South and Kasahara 1992: 49; South and N'Yeurt 1993: 124, fig. 19.

Caulerpa racemosa (Forsskål) J. Agardh var. ***clavifera*** (Turner) Weber-van Bosse 1898: 361, pl. 33, figs 1–3; Okamura 1913: 66, pl. 119, fig. 1 (f. *macrophysa*); 1931: 102; Yamada and Tanaka 1938: 60 (f. '*microphysa*'); Gilbert 1942: 18; 1946: 78; Taylor 1950: 62; Dawson 1957: 106, fig. 9*c*; Taylor 1960: 152, pl. 17, fig. 7; pl. 18, fig. 3; Chapman 1961: 146, fig. 171; Gilbert 1961: 437; Jaasund 1976: 25, fig. 50; Meñez and Calumpong 1982: 7, pl. 2*A*; Dong and Tseng 1984: 282, pl. 140, fig. 4; Payri and Meinesz 1985*a*: 507; Lewis 1987: 23; Lewis and Norris 1987: 9; Garrigue and Tsuda 1988: 57; Abbott 1989: 226; Coppejans and Beeckman 1989: 384, fig. 4.

Fucus clavifer Turner 1808: 126 (type locality: Red Sea).

Caulerpa clavifera (Turner) C. Agardh 1817: 23; Dickie 1874: 197; 1876: 244; Howe 1932: 169.

Chauvinia clavifera (Turner) Bory de St Vincent 1829 (1826–1829): 207.

(Figs 28, 36)

Plants up to 15 cm long, with spreading stolon 3 mm in diameter and ventral branchlets beset with rhizoids. Ascending foliar axes up to 3 cm long, bearing up to 15 radially disposed stipitate ramelli with subspherical inflated ends 2–4 mm in diameter. Colour dark to light green, the larger plants noticeably paler in hue. Some plants (especially those in sandy locations) are provided with extensive rhizoids up to 15 mm long, covering c. 30% of the spreading stolon.

Distribution

Tropical oceans.

Fijian Records

Chapman 1971: 166; South and Kasahara 1992: 49.

Rotuman Distribution

Fapufa (F4/ USP 412); Hapmafau (HAP13/ USP 366, HAP26/ USP 368); Lopta (L2/ USP 365, L5/ USP 370); Maka Bay (MAK2/ USP 364, MAK6/ USP 367, MAK10/ USP 414).

Habitat and Remarks

This plant is found in relatively sheltered, mainly sandy locations in the back reef, or as an epiphyte on large *Halimeda opuntia* clumps or coral heads. At Isilepi, extensive growth of this variety occurs on sand-covered coral heads together with *C. serrulata*. Smaller plants can be concealed within coral rubble on the middle reef, or within thick *Chlorodesmis major* or *Dictyota friabilis* mats. Mainly found in back reef locations such as Hapmafau and Maka Bay, where they attain large sizes.

Caulerpa racemosa (Forsskål) J. Agardh var. ***peltata*** (Lamouroux) Eubank 1946: 421, fig. 2*r, s*; Gilbert 1961: 439; Tsuda 1964: 5; Meñez and Calumpong 1982: 8, pl. 2*K*; Lewis 1987: 22; Lewis and Norris 1987: 9; Silva *et al.* 1987: 108; Garrigue and Tsuda 1988: 58; Abbott 1989: 226; Coppejans and Beeckman 1989: 388, figs 27–29; Littler *et al.* 1989: 46; Coppejans 1992: 401; Coppejans and Prud'homme van Reine 1992*a*: 173; 1992*b*: 696, fig. 17*B*; Ohba and Enomoto 1992: 28; Verheij and Prud'homme van Reine 1993: 124, pl. 2, fig. 4; Wynne 1993: 22.

Caulerpa peltata Lamouroux 1809*b*: 332 (type locality: Antilles); Dickie 1876: 244; Weber-van Bosse 1898: 373, pl. 31, fig. 9; 1913*a*: 110; 1931: 102; 1932 (1929–1932): 60, pl. 280, figs 10–12 (var. *typica*); Lucas 1935: 199; Yamada and Tanaka 1938: 61 (var. *typica*); Gilbert 1942: 22 (var. *typica*); Taylor 1950: 65; Dawson 1956: 35, fig. 16*b*; 1957: 106; Taylor 1960: 155, pl. 17, fig. 2; pl. 18, fig. 1; Chapman 1961: 149, fig. 177; Durairatnam 1961: 27; Taylor 1966: 350 (var. *peltata*); Trono 1968: 169, pl. 14, fig. 3;

Womersley and Bailey 1970: 275; Dawes 1974: 75; Jaasund 1976: 27, fig. 53; Taylor 1977: 8; Tsuda and Wray 1977: 94; Dong and Tseng 1984: 282, pl. 140, fig. 3; Payri and Meinesz 1985*a*: 507; Trono 1986: 216, figs 11, 12; South and Yen 1992: 127; Millar and Kraft 1994*b*: 438.

Caulerpa peltata Lamouroux f. *nummularia* (Harvey) Dawson 1957: 106, fig. 10.

Caulerpa peltata Lamouroux var. *nummularia* (Harvey) Weber-van Bosse 1898: 376.

Caulerpa peltata Harvey (see Tsuda 1991: 41).

(Figs 31, 37)

Plants typically small and occurring as single stolons up to 1 mm in diameter, occasionally forming clumps 5–10 cm across of densely intermingled plants, each c. 8 cm long and sparingly provided with short rhizoidal branches. Spreading stolon bearing short cylindrical erect foliar axes 1–1.5 cm long at 2–3 mm intervals, these producing thin peltate discs 3–5 mm in diameter either singly at the end, or several discs axially arranged around the main foliar branches.

Distribution

Tropical oceans.

Fijian Records

Kasahara 1985: 30; Kasahara 1988; South 1991: 5; South and Kasahara 1992: 50; South and N'Yeurt 1993: 128, fig. 23.

Rotuman Distribution

Hapmafau (HAP8/ USP 372); Lopta (L8); Maka Bay (MAK1/ USP 371, MAK5/ USP 369).

Habitat and Remarks

Typically found in cryptic locations, such as creeping over staghorn coral rubble or hidden under rocks on inner reef. Where it occurs in sheltered back reef sites (e.g. Hapmafau, Maka Bay) it can form distinct clumps or mats up to 15 cm diameter over sand-covered rocks or smooth substrata. Many plants examined showed distinct dent-like grazing marks on the disc edges.

Sometimes classified as a separate species, there occurs a range of intermediate forms between *Caulerpa racemosa* var. *peltata* and var. *turbinata*. While the line of distinction between these forms varies amongst authors, the variety described here occupies the peltate extreme of the range, with unmistakable thin disc-like ramuli. There is still debate as to whether the varietal status of *C. racemosa* var. *peltata* is valid, with some authors (e.g. Millar and Kraft 1994*b*) preferring to consider *Caulerpa peltata* a distinct species pending DNA studies on the type or authentic specimens.

Caulerpa racemosa (Forsskål) J. Agardh var. ***turbinata*** (J. Agardh) Eubank 1946: 420, fig. 20*q*; Dawson 1956: 35, fig. 16*a*; Taylor 1960: 152; Tsuda 1964: 5; Taylor 1977: 10; Lewis 1987: 24; Lewis and Norris 1987: 9; Silva *et al.* 1987: 108; Abbott 1989: 226; Coppejans and Beeckman 1989: 386, figs 24–26; Coppejans 1992: 401; Coppejans and Prud'homme van Reine 1992*a*: 174; 1992*b*: 698, fig. 19*A, B*; South and N'Yeurt 1993: 129, fig. 24; Verheij and Prud'homme van Reine 1993: 124, pl. 2, fig. 6; Wynne 1993: 22.

Caulerpa clavifera (Turner) C. Agardh var. *turbinata* J. Agardh 1837: 173 (type locality: near Tor, Sinai Peninsula, Egypt).

Caulerpa chemnitzia (Esper) Lamouroux; Svedelius 1906; Durairatnam 1961: 28.

Fucus chemnitzia Esper 1800: 167 (given as '127'), pl. LXXXVIII (type locality: Malabar Coast, India).

Caulerpa racemosa (Forsskål) J. Agardh var. *chemnitzia* (Esper) Weber-van Bosse 1898: 370, pl. 31, figs 5–8; Gilbert 1961: 437; Payri and Meinesz 1985*a*: 507.

(Fig. 29)

Plants characteristically lacking a well-defined spreading stolon, the ramelli up to 1.5 mm long and trumpet-shaped with concave, flattened ends 1–3 mm in diameter and radially disposed in dense fashion around foliar branches up to 25 mm in length. This variety is intermediate between var. *clavifera* and var. *peltata*.

Distribution

Fiji, Marshall Islands, Tahiti, Papua New Guinea, northern Australia, Indonesia, Hawaii, Philippines, Taiwan, tropical Americas, India.

Fijian Record

New record for Fiji.

Rotuman Distribution

Lopta (L3/ USP 374, L13/ USP 373, L22/ USP 413).

Habitat and Remarks

Found in relatively exposed locations on outer reef, growing together with var. *uvifera*.

Caulerpa racemosa (Forsskål) J. Agardh var. ***uvifera*** (Turner) J. Agardh 1816: 81; Weber-van Bosse 1898: 362, pl. 33, figs 6, 7; fig. 23; 1913*a*: 105; Taylor 1928: 102, pl. 12, fig. 6; pl. 13, fig. 3; 1950: 63; 1960: 153, pl. 17, fig. 3; pl. 18, fig. 4; Dawson 1957: 106; Chapman 1961: 148, fig. 174; Gilbert 1961: 440; Valet 1968: 45, pl. 7, fig. 2; Womersley and Bailey 1970: 276; Meñez and Calumpong 1982: 9, pl. 2*D*; Lewis 1987: 24; Garrigue and Tsuda 1988: 58.

Fucus uvifer Turner 1816: 8, pl. 230 (type locality: Red Sea).

Caulerpa uvifera C. Agardh 1817: 23.

Caulerpa uvifera (Turner) Svedelius 1906*a*: 122, figs 15–17; Durairatnam 1961: 27.

Caulerpa racemosa var. *uvifera* Weber-van Bosse; Okamura 1932 (1929–1932): 53, pl. 280, figs 7, 8; Chapman 1955: 355.

(Fig. 27*a*, *b*)

Plants forming clumps up to 15 cm in diameter, composed of numerous small spreading stolons with relatively short (1–1.5 cm) assimilators densely beset with imbricate ramelli up to 1.5 mm in diameter, disposed radially around the foliar axis. Ramelli club to trumpet shaped, with a semi-hemispherical and somewhat flattened end borne on a distinct stalk up to 2.3 mm long. This dense arrangement of small ramelli imparts a distinctive grape-like appearance to the clusters of plants.

Distribution

Tropical Pacific and Indian Oceans.

Fijian Records

Chapman 1971: 166; Kasahara 1985: 31; South 1991: 5; South and Kasahara 1992: 50.

Rotuman Distribution

Lopta (L6/ USP 375, L12/ USP 376).

Habitat and Remarks

Found in generally exposed locations, growing in dense circular clumps on the outer reef, often epizoic on living soft coral heads. Where it occurs together with var. *clavifera*, the latter tends to occupy the back reef area while var. *uvifera* dominates the outer reef face, sometimes forming a cover several m^2 in area, as at Lopta. This alga is edible, and used in traditional Rotuman dishes as a salad with coconut milk and lemon juice. It is locally known as *lum ne 'po.*

Intermediate variety between ***Caulerpa racemosa*** (Forsskål) J. Agardh var. ***turbinata*** and var. ***peltata***: Coppejans and Beeckman 1989: 391, pl. 4, fig. 29; Coppejans 1992: 403; Coppejans and Prud'homme van Reine 1992*b*: 701, fig. 17*A*; South and N'Yeurt 1993: 130, fig. 25.

Plants up to 3 cm long, with no distinct spreading stolon; the foliar branches bearing peltate to sub-discoid or turbinate, terminally inflated ramelli, often on the same branch. There exists a great variety of intermediate forms between the ramelli on a single plant, from characteristically dentate and undulated discs 1.3–1.5 mm in diameter to turbinate, trumpet-shaped ramelli up to 1 mm in diameter. However, the peltate ramelli are slightly thicker than in var. *peltata*, while the turbinate ramelli have somewhat more flattened ends than occurs in var. *turbinata*. Hence, it appears to be a distinct intermediate variety, with branchlets numerous on a single upright axis.

Distribution

Fiji, Papua New Guinea, Indonesia, Kenya.

Fijian Record

New record for Fiji.

Rotuman Distribution

Lopta (L9/ USP 442).

Habitat and Remarks

Generally found on the outer reef, together with var. *uvifera* and var. *turbinata*, where it is more abundant than the latter.

Caulerpa serrulata (Forsskål) J. Agardh 1837: 174; Gilbert 1942: 14 (incl. var. *typica* f. *serrulata*); 1946: 78; Eubank 1946: 418, fig. 2h–j; Taylor 1950: 57, pl. 30, fig. 1; 1960: 145, pl. 14, fig. 5; 1966: 351; 1977: 10 (as var. *serrulata*); Egerod 1952: 369; Dawson 1954: 393, fig. 10*a*; 1956: 38, fig. 23; 1957: 105; Moul 1957: 41; 1959: 164; Gilbert 1961: 440; Meñez 1961: 53; Trono 1968: 169, pl. 14, figs 1–2; pl. 16, fig. 4, 8; pl. 17, fig. 9; Valet 1968: 43, pl. 9, fig. 1; Womersley and Bailey 1970: 276; Jaasund 1976: 23, fig. 48; Tsuda and Wray 1977: 95; Meñez and Calumpong 1982: 9, pl. 2*E*; Dong and Tseng 1984: 284, pl. 141, fig. 1; Payri and Meinesz 1985*a*: 507; Trono 1986: 218, fig. 14; Lewis 1987: 24; Lewis and Norris 1987: 9; Silva *et al.* 1987: 108; Garrigue and Tsuda 1988: 58; Abbott 1989: 226; Coppejans and Beeckman 1989: 120, figs 24, 25; Littler *et al.* 1989: 44; Tsuda 1991: 41; Coppejans 1992: 403; Coppejans and Prud'homme van Reine 1992*a*: 174; 1992*b*: 701, fig. 20*B*; Ohba and Enomoto 1992: 28; Verheij and Prud'homme van Reine 1993: 125, pl. 2, fig. 8.

Fucus serrulatus Forsskål 1775: 189 (type locality: Mokha, Yemen).

Caulerpa freycinetii C. Agardh 1822*a*: 446 (type locality Mariana I.) (see Børgesen 1932: 5); Weber-van Bosse 1898: 310, pl. 25, figs 4–11; pl. 26, fig. 1–6; 1913*a*: 102; Okamura 1913: 18, pl. 105, figs 1–3 (var. *typica* f. *lata*); 1931: 101; Tsuda and Wray 1977: 94; Lewis and Norris 1987: 9 (as var. *freycinetti* f. *lata* Weber-van Bosse).

(Figs 32, 38, 39)

Fairly large plants, with spreading stolon up to 20 cm long and 2 mm wide, possessing ventral rhizoid-bearing branches and assimilators up to 7 cm tall at 1–4 cm intervals along the spreading stolon. The foliar branches several times dichotomously or irregularly branched, terete below up to point of dichotomy, the rest compressed (1–2 mm broad) with moderate to strong twisting and serrated margins; the serrations more pronounced on the outwardly facing edge of the twist.

Distribution

Tropical oceans.

Fijian Records

Chapman 1971: 166; Kasahara 1985: 26; 1988; South 1991: 5; South and Kasahara 1992: 50; South and N'Yeurt 1993: 117, fig. 12; in Herb Bishop Museum, Hawaii (BISH 623619; 623625).

Rotuman Distribution

Isilepi (I1/ USP 380); Lopta (L7/ USP 379); Maka Bay (MAK3/ USP 377, MAK4/ USP 378).

Habitat and Remarks

Found on sandy substrata in relatively shallow (20–40 cm) waters in the back reef area, typically creeping in the sand with only the erect foliar axes protruding. The strong degree of twisting and serrations may offer an advantage to the plant by increasing grazing difficulty, although this opinion has to be substantiated with evidence.

Caulerpa serrulata (Forsskål) J. Agardh var. ***boryana*** (J. Agardh) Gilbert f. ***occidentalis*** (Weber-van Bosse) Yamada et Tanaka 1938: 62; Taylor 1950: 60; 1960: 146; Meñez and Calumpong 1982: 9, pl. 2*F*; Silva *et al.* 1987: 109; Coppejans 1992: 403, fig. 7; South and N'Yeurt 1993: 118, fig. 13.

Caulerpa freycinetii (C. Agardh) var. *boryana* f. *occidentalis* Weber-van Bosse 1898: 315, pl. 25, fig. 11 (type locality: Guadeloupe); Okamura 1913: 19, pl. 105, figs 4–6.

Caulerpa hummii Díaz-Piferrer 1969: 13, fig. 1 (type locality: Orquilla Island, Archipiélago Los Hermanos, Venezuela); Taylor 1977: 11, 12.

(Figs 30, 40)

Plants up to 10 cm long, the spreading stolon about 1 mm in diameter and possessing numerous rhizoid-bearing branches on the underside, and erect, mostly non-twisted dichotomously branched foliar axes above. The foliar branches up to 5 cm tall and 4 mm broad, with serrations at 0.5–0.8 mm intervals along the edges. Some vaguely twisted branches may occasionally occur on the same stolon.

Distribution

Fiji, Marshall Islands, Papua New Guinea, Philippines.

Fijian Record

New record for Fiji.

Rotuman Distribution

Hapmafau (HAP11/ USP 381).

Habitat and Remarks

Found on the back reef, in relatively protected sandy locations, often mixed with other *Caulerpa* varieties.

Codiaceae

Codium Stackhouse 1797

Key to the Rotuman Species of *Codium*

1. Thallus aplanate and convoluted ..... *C. arabicum*
1: Thallus terete or globular, not convoluted 2
2. Thallus terete ..... *C. bulbopilium*
2: Thallus globular ..... *C.* sp.

Codium arabicum Kützing 1856: 35, pl. 100, fig. 2 (type locality: Tor, Sinai Peninsula, Gulf of Suez, Egypt); Egerod 1952: 382, pl. 34*b*, figs 11–13; Dawson 1956: 38, fig. 24; 1957: 107; Trono 1968: 190, pl. 15, fig. 4; Valet 1968; Trono 1973: 221; 1973c: 13, fig. 5; 1986: 24, fig. 25; Jaasund 1976: 33, fig. 66; Tsuda and Wray 1977: 96; Magruder and Hunt 1979: 25; Jones and Kraft 1984: 255, figs 1–2; Dong and Tseng 1984: 296, pl. 147, fig. 2; Payri and Meinesz 1985*a*: 509; Heijs 1987: 147; Lewis 1987: 17; Lewis and Norris 1987: 8; Silva *et al.* 1987: 111; Garrigue and Tsuda 1988: 59; Abbott 1989: 225; Yoshida *et al.* 1990: 274; Coppejans and Prud'homme van Reine 1992*a*: 50; Verheij and Prud'homme van Reine 1993: 127, pl. 3, fig. 5; Millar and Kraft 1994*b*: 432.

Codium coronatum Setchell 1926: 82, pl. 10, figs 2–5; pl. 11, figs 2, 3, pl. 12, figs 1, 5 (type locality: Arue Reef, Tahiti); Gilbert 1947: 123; 1961: 442; Payri and Meinesz 1985*a*: 509.

Codium adhaerens (misapplied name; *vide* Silva *et al.* 1987); Dickie 1876: 243; Okamura 1915(1913–1915): 140, pl. 134, figs 1–3; Yamada and Tanaka 1938: 63; Gilbert 1946: 78; 1947: 123; Durairatnam 1961: 22, pl. IV, fig. 1; Gilbert 1961: 442; Chapman 1977: 162; Lewis 1987: 17; Lewis and Norris 1987: 8; Tsuda 1991: 42.

(Figs 41, 43, 59)

Thallus applanate and dorsiventral, up to 15 cm broad and 1 cm thick; dark green and adhering strongly to the substratum. Orbicular excrescences present, with older plants assuming a convoluted habit. Medullary filaments 17–23 μm in diameter; peripheral utricles clavate to pyriform, 58–88 μm broad and 380–500 μm long, with rounded apices.

Distribution

Fiji, New Caledonia, Marshall Islands, Caroline Islands, Tahiti, Papua New Guinea, Australia, Lord Howe Island, Hawaii, Taiwan, Philippines, Indonesia, Japan, China, Ceylon, Tanzania.

Fijian Records

Chapman 1971: 165 (as *C. adhaerens*); Kasahara 1985: 14, pl. 1, fig. 3 (as *C. coronatum* var. *aggregata* Børgesen); South and Kasahara 1992: 50 (listed as both *C. coronatum* and *C. arabicum*).

Rotuman Distribution

Lopta (L20/ USP 410), Tua'koi (T7/ USP 409).

Habitat and Remarks

Found on the middle reef, sometimes covering large areas of coral rubble exposed at low tide (e.g. at Lopta, where it is the dominant cover in some places).

Codium bulbopilum Setchell 1924: 173, fig. 38 (type locality: Aua, Western Samoa); Setchell 1926: 84, pl. 11, fig. 1; pl. 12, fig. 2; Lucas 1935: 204, pl. 5, fig. 3; Valet 1968; Jones and Kraft 1984: 26, figs 4, *5B–F*; Payri and Meinesz 1985*a*: 509; Lewis 1987: 18; Garrigue and Tsuda 1988: 59; Millar and Kraft 1994*b*: 433.

(Figs 42, 45)

Thallus dark-green, terete and imbricating with axes arching downwards. Branching irregularly dichotomous, axes 2–3 mm in diameter and up to 8 cm long. Medullary filaments 35–41 μm in diameter, up to 2 arising per utricle. Peripheral utricles obovoid, cylindrical to subspherical 140–235 μm broad and 382–500 μm long with rounded apices and occasional hairs up to 29 μm in diameter arising from the apical zone. Thallus anastomosing, attached to substratum at intervals.

Distribution

Fiji, New Caledonia, Samoa, Tahiti, Lord Howe Island, northern Australia.

Fijian Records

Kasahara 1985: 15, pl. 1, fig. 4; pl. 14, fig. A; South 1991: 5; 1993; South and Kasahara 1992: 50.

Rotuman Distribution

Tua'koi (T8/ USP 407, T9/ USP 408).

Habitat and Remarks

Found in the middle reef, either attached to coral rubble in association with *C. arabicum* (Lopta) or growing at the base of rocks (Tua'koi). This alga is edible, and used in traditional Rotuman dishes (either as a salad or boiled in coconut milk). The dried thallus is also used as a scouring pad. It is locally known as *lum ne finau.*

***Codium* sp.**

(Figs. 18, 44, 46, 47)

Growing solitarily in the middle reef, attached to coral rubble was a plant (Figs 18, 44, 46, 47) that closely resembles *Codium ovale* Zanardini, reported from the Marshall Islands by Dawson (1956: 39, fig. 25). The central stipe in the Rotuman specimen is much less pronounced than in *C. ovale*. The thallus is ovoid–globular, up to 20 mm in diameter and basally attached to substratum by a central peduncle 1.5–2 mm in diameter. Utricles 400–640 μm long and 100–170 μm in diameter.

Rotuman Distribution

Tua'koi (T21/USP 618).

Halimedaceae

Halimeda Lamouroux 1812

Key to the Rotuman Species of *Halimeda*

(Adapted in part from South 1992)

1. Distinct holdfast present 2
1: Distinct holdfast absent 3
   2. Holdfast large to massive, calcification moderately heavy; segments reniform, cuneate or otherwise ..... *H. simulans*
   2: Holdfast small, not massive; calcification light to heavy; segments not reniform 4

3. Plants attached by rhizoids when in contact with the substratum; sprawling or in clumps; segments ribbed 9
3: Plants attached by an inconspicuous holdfast, spreading or compact in form, often forming cushion-like clumps; segments not ribbed ..... *H. tuna*
4. Plants fragile, friable; surface of segments dull, rugose, noticeably pitted ..... *H. macrophysa*
4: Plants not fragile or friable; segments not dull, rugose or noticeably pitted 5
5. Segments very large, c. 20 × 15 mm; discoid to reniform ..... *H. discoidea*
5: Segments less than 20 × 15 mm, deltoid to reniform, not discoid 6
6. Basal segment a flat, fan-shaped fusion structure up to 10 mm broad, lower segments trilobed ... . *H. micronesica*
6: Basal segment not a fan-shaped fusion structure, lower segments not trilobed 7
7. Segments 10 (–11) mm long × 18 (–20) mm broad; many of the segments supported by a cushion segment, or a stalk region of uncorticated medullary filaments ..... *H. cuneata*
7: Segments 5 (–8) mm long × 5 (–15) mm broad, not supported by a cushion segment or a stalk region of uncorticated medullary filaments 8
8. Calcification rather heavy, utricles remaining laterally adherent following decalcification; nodal medullary filaments not especially entangled and adhering only slightly ..... *H. bikinensis*
8: Calcification moderate, utricles usually separating following decalcification; nodal medullary filaments entangled and strongly adhering ..... *H. taenicola*
9. Plants forming erect bushy clumps with a single holdfast; segments reniform, not oval, ribbed and trilobed at base of plant, 5 × 10 mm; branching dense and irregular to opposite, in many planes; calcification light to moderate. Peripheral utricles small and rounded in surface view, 10–12 μm in diameter ..... *H. opuntia* var. *opuntia*
9: Plants creeping or pendulous in habit, not forming erect bushy clumps; holdfasts multiple; segments reniform to oval, slightly ribbed, 5 × 6 mm; branching sparse, in one plane; calcification moderate to heavy. Peripheral utricles large and hexagonal in surface view, 26–27 μm in diameter .... *H. opuntia* var. *hederacea*

Halimeda bikinensis W.R. Taylor 1950: 87, pl. 48, fig. 1 (type locality: Bikini Atoll, Marshall Islands); Hillis 1959: 358, pl. 2, fig. 1; pl. 5, figs 17, 18; pl. 6, fig. 3; pl. 10; Tsuda and Wray 1977: 97; Hillis-Colinvaux 1980: 141, fig. 43; Silva *et al.* 1987: 114; Ohba and Enomoto 1992: 29.

(Figs 65, 68, 77)

Plants up to 15 cm tall 12 cm broad. Holdfast small, basal segment single and small. Segments oval to reniform, slightly bent and heavily calcified, 5–15 mm broad, 5–8 mm high. Surface dull and brittle, slightly yellowish at base. Many specimens with moderate coralline algal (*?Lithophyllum* sp.) encrustation on base. Cortical utricles in surface view hexagonal, 26–28 μm in diameter. Medullary filaments generally fused in 3s at the node.

Distribution

Fiji, Marshall Islands, Papua New Guinea, Philippines.

Fijian Records

Kasahara 1988; South 1992: 5, figs 1, 2; South and Kasahara 1992: 50.

Rotuman Distribution

Hoféa (H1, H10-12, H24, H30/ USP 390, H31, H32/ USP 389, H33, H34/ USP 388, H38, H41, H45/ USP 387, H49, H54, H66, H73, H79, H86, H91, H93, H95, H100, H109); *Oinafa* (O5, O33, O70).

Habitat and Remarks

Deep pools on inner reef flat, hanging from coral shelves and ledges (*Hoféa*); within cavities on inner reef flat and pools, below low tide level (*Oinafa*). The specimens generally agreed with the description given by Taylor (1950).

Halimeda cuneata Hering in Krauss 1846: 214 (type locality Durban, South Africa); Okamura 1915(1913–1915): 202, pl. 147; Dawson 1956: 41, fig. 29; Hillis 1959: 345, pls 1, 5–7, 9; Meñez 1961: 58, pl. 4, figs 43–46; pl. 5, figs 54, 55; Tsuda and Wray 1977: 97; Hillis-Colinvaux 1980: 124, figs 36,61; Lewis 1987: 28; Lewis and Norris 1987: 9; Silva *et al.* 1987: 114; Millar and Kraft 1994*b*: 435.

Halimeda obovata Kützing 1858: 11, pl. 25, fig. 1.

Halimeda versatilis J. Agardh 1887: 86.

(Figs 66, 78)

Plants to 8 cm tall, arising from single, small holdfast. Calcification light, colour greenish-cream. Segments plane and thin, mostly cuneate with some discoid tendency in upper parts; up to 14 mm broad and 16 mm high. Many of the segments supported by a cushion segment, or a stalk region of uncorticated medullary filaments. Peripheral utricles hexagonal in surface view, 35–37 μm in diameter. Up to 4 of these supported per secondary utricle.

Distribution

Fiji, Marshall Islands, Australia, Philippines, Taiwan, South Africa.

Fijian Records

Kasahara 1985: 18, pl. 2, fig. 2; pl. 14, fig. c (as *H. cuneata f. undulata* Barton); South 1991: 5; South 1992: 5, figs 9–11; South and Kasahara 1992: 51.

Rotuman Distribution

Hoféa (H3/ USP 391, H60).

Habitat and Remarks

Pools in inner reef flat, often found within protective red algal mats.

Halimeda discoidea Decaisne 1842: 102 (type locality: 'Kamschatka', Russia *fide* Silva *et al.* 1987); Taylor 1950: 85, pl. 45, fig. 1; 1960: 179, pl. 24, fig. 2; Egerod 1952: 398, pl. 38, fig. 19*b–d*; Hillis 1959: 352, pl. 2, fig. 5; pl. 5, fig. 11; pl. 6, fig. 11; pl. 7, figs 9, 10; pl. 8, figs 5–8; pl. 11; Levring 1960: 122; Trono 1968: 183, pl. 17, figs 1–3; Womersley and Bailey 1970: 281; Dawes 1974: 81; Jaasund 1976: 31, fig. 62; Tsuda and Wray 1977: 97; Sartoni 1979: 280, fig. 1*f*; Hillis-Colinvaux 1980: 136, fig. 41; Dong and Tseng 1984: 288, pl. 143, fig. 2; Payri and Meinesz 1985*b*: 642, fig 1; fig. 5; fig. 9; figs 35, 36; Trono 1986: 230, fig. 30; Lewis 1987: 28; Lewis and Norris 1987: 9; Silva *et al.* 1987: 114; Garrigue and Tsuda 1988: 59; Abbott 1989: 226; Littler *et al.* 1989: 90; Tsuda 1991: 42; Tsuda and Kamura 1991: 69, pl. 4, fig. 1; Coppejans and Prud'homme van Reine 1992*a*: 175; Ohba and Enomoto 1992: 29; Verheij and Prud'homme van Reine 1993: 135, pl. 5, fig. 3; Millar and Kraft 1994*b*: 435.

Halimeda discoidea var. *platyloba* Børgesen 1911: 134, fig. 3.

Halimeda discoidea f. intermedia Gilbert 1947: 126.

Halimeda discoidea f. subdigitata Gilbert 1947: 125.

Halimeda tuna Barton 1901: 11 (p.p.).

?Halimeda cuneata Hering *f. digitata* Barton 1901: 16, pl. 2, fig. 9.

(Figs 67, 79)

Plants to 7 cm tall, single short stalk-like segment at base. Lightly calcified, light green to cream in colour. Segments large (up to 20 mm broad and 15 mm high) and in a single plane, mostly branching dichotomously. Peripheral utricles hexagonal in surface view, between 36

to 38 μm in diameter. Secondary utricles up to 110 μm in diameter, distinctly inflated, supporting up to 4 primary utricles. Cortex generally 2-layered.

Distribution

Tropical Indian and Pacific Oceans, Caribbean.

Fijian Records

Chapman 1971: 166; Kasahara 1988, South 1992: 6, figs 15–17; South and Kasahara 1992: 18.

Rotuman Distribution

Hoféa (H18); *Hapmafau* (HAP4); *Mea* (M1/ USP 392).

Habitat and Remarks

Tidal pools on inner reef, within mats of *Melanamansia glomerata* (*Mea*); bottom of tidal pools, uncommon (*Hoféa*); shallow tidal pools, single specimen (*Hapmafau*).

Halimeda macrophysa Askenasy 1888: 14, pl. IV, figs 1–4 (type locality: Makutu Island, Fiji); Barton 1901: 17, pl. 2, figs 15–18; Weber-van Bosse 1913: 121; Dawson 1957: 108, fig. 12; Hillis 1959: 361, pl. 2, fig. 3; pl. 5, fig. 16; pl. 6, fig. 8; pl. 11; Womersley and Bailey 1970: 282; Tsuda and Wray 1977: 98; Hillis-Colinvaux 1980: 134, figs 40, 99; Trono 1986: 233, fig. 34; Lewis 1987: 30; Silva *et al.* 1987: 115; Garrigue and Tsuda 1988: 60; Ohba and Enomoto 1992: 29; Verheij and Prud'homme van Reine 1993: 136, pl. 6, fig. 1.

(Figs 71, 80)

Plants up to 50 mm tall, 100 mm in diameter, arising from a single small holdfast and spreading outward in a cushion-like manner. Segments fragile and reniform, up to 20 mm broad and 10 mm high, outer margins often undulated. Colour pale green to white upon drying, dull and moderately calcified with characteristic flexibility. Peripheral utricles large, rounded and separate following decalcification, about 100 μm in diameter. Secondary utricles branching dichotomously.

Distribution

Fiji, New Caledonia, Marshall Islands, Solomon Islands, Papua New Guinea, northern Australia, Philippines.

Fijian Records

Chapman 1971: 166; Kasahara 1985: 21; South 1992: 8, figs 12–14; South and Kasahara 1992: 18.

Rotuman Distribution

Hoféa (H28, H61-62, H65, H88, H97, H108, H214/ USP 393, H215); *Lopta* (L1); Mea (M4).

Habitat and Remarks

Low-profile, common within rock cavities or depressions on inner reef flat. A peculiar commensal crab was found on one specimen (Fig. 208), mimicking the shape of an intergeniculum of its host-plant. The genus of this associated invertebrate is currently under investigation.

Halimeda micronesica Y. Yamada 1941: 121, fig. 15; 1944*b*: 29, pl. 5 (type locality: Ant atoll, Ponape Island, East Carolines); Taylor 1950: 89, pl. 46, fig. 2; pl. 47; Hillis 1959: 364,

pl. 3, fig. 1; pl. 5, figs 13, 14; pl. 6, fig. 2; pl. 9; Trono 1968: 186, pl. 17, fig. 6; Womersley and Bailey 1970: 282; Itono 1973: 160, fig. 21; Tsuda and Wray 1977: 98; Hillis-Colinvaux 1980: 149; Dong and Tseng 1984: 290, pl. 144, fig. 1; Payri and Meinesz 1985*b*: 643, figs 16, 18, 24, 46; Lewis 1987: 30; Silva *et al.* 1987: 115; Tsuda 1991: 43; Tsuda and Kamura 1991: 71, pl. 4, figs 2, 3; Coppejans and Prud'homme van Reine 1992*a*: 176; Verheij and Prud'homme van Reine 1993: 137, pl. 6, fig. 3; Wynne 1993: 22, fig. 10.

Halimeda orientalis Gilbert 1947: 126, fig. 1.

(Figs 69, 81, 82)

Plants up to 9 cm tall 10 cm broad, bushy. Basal segment a distinctive flat, fan-shaped fusion structure up to 10 mm broad and 5 mm high, supporting many closely-spaced, mostly monoplanar branches. Lower segments trilobed, intermediate segments deltoid and slightly ribbed, outer segments oval to deltoid, not ribbed, 2–3 mm broad and 1–2 mm high. Colour dull greenish-white, segments small and brittle. Cortical utricles rounded and separate in surface view, 20–21 μm in diameter, branching dichotomous.

Distribution

Marshall Islands, Caroline Islands, Solomon Islands, Tahiti, northern Australia, Indonesia, China, Maldives.

Fijian Record

New record for Fiji.

Rotuman Distribution

Oinafa (O8, O17, O20, O27, O28-29, O31, O39, O50/ USP 394, O55, O58, O60/ USP 396); Hapmafau (HAP2/ USP 395).

Habitat and Remarks

Common in deep pools on inner reef flat, often epiphytic on *H. bikinensis* and *H. taenicola*. Characteristic rope-like uncorticated medullary filaments extend 5–6 cm from some basal segments over the substratum, bearing a young plant at the end. This is a mode of vegetative reproduction in this species, as well as a means of added attachment to the substratum (Wynne 1993).

Halimeda opuntia (Linnaeus) Lamouroux 1812: 186; Barton 1901: 18, pl. 2, figs 19–27; Weber-van Bosse 1913: 121; Setchell 1935: 263; Yamada and Tanaka 1938: 63; Taylor 1950: 80, pl. 39, fig. 1; Egerod 1952: 397, pl. 3, fig. 19*a*, *e*, *f*; Dawson 1954: 395, fig. 12; 1956: 41; 1957: 109; Hillis 1959: 359, pl. 2, figs 7, 8; pl. 5, figs 3, 4; pl. 6, fig. 6; pl. 7, fig. 3; pl. 10; Levring 1960: 122; Taylor 1960: 176, pl. 23, fig. 3; pl. 24, fig. 1; Chapman 1961: 127; Durairatnam 1961: 24, pl. 6, figs 1, 2; Tsuda 1964: 7; Trono 1968: 178, pl. 18, figs 1–4; Valet 1968: 46; Womersley and Bailey 1970: 282; Dawes 1974: 82; Jaasund 1976: 33, fig. 65; Tsuda and Wray 1977: 98; Sartoni 1979: 284, fig. 4*c*; Hillis-Colinvaux 1980: 110, figs 19, 51, 92; Dong and Tseng 1984: 290, pl. 144, fig. 2; Payri and Meinesz 1985*a*: 509; 1985*b*: 644, figs 26, 29, 32, 48, 49; Trono 1986: 234, fig. 35; Heijs 1987: 149; Lewis 1987: 30; Lewis and Norris 1987: 9; Silva *et al.* 1987: 115; Garrigue and Tsuda 1988: 60; Tsuda 1991: 43; Abbott 1989: 226; Littler *et al.* 1989: 94; Tsuda and Kamura 1991: 65, pl. 2, fig. 4; Coppejans and Prud'homme van Reine 1992*a*: 176; Ohba and Enomoto 1992: 29; Verheij and Prud'homme van Reine 1993: 137, pl. 6, figs 5, 6.

Corallina opuntia Linnaeus 1758: 805 (type locality: Jamaica).

Halimeda cordata J. Agardh 1887: 83 (see Tsuda and Wray 1977; Hillis-Colinvaux 1980; Silva *et al.* 1987).

Halimeda opuntia (Linnaeus) Lamouroux f. *cordata* (J. Agardh) Barton 1901: 20, pl. 2, fig. 20; Okamura 1915 (1913–1915): 207, pl. 148, figs 1–7.

Halimeda triloba Decaisne 1842: 102.

Halimeda opuntia (Linnaeus) Lamouroux f. *triloba* (Decaisne) J. Agardh 1887: 84; Taylor 1960: 176; Verheij and Prud'homme van Reine 1993: 138, pl. 6, fig. 6.

?Halimeda opuntia (Linnaeus) Lamouroux var. *macrocarpa* Askenasy.

(Fig. 70*a–c*)

Fijian Records

Askenasy 1888; Chapman 1971: 166; Kasahara 1985: 22, pl. 2, fig. 3; Kasahara 1988; South 1991: 5; South 1992: 9, figs 26–28; South and Kasahara 1992: 51.

Halimeda opuntia (Linnaeus) Lamouroux var. ***opuntia*** Hillis 1959: 360, pl. 2, fig. 8; pl. 5, fig. 3; Chapman 1977: 162; Wynne 1993: 23, fig. 11.

(Figs 70*b*, 83)

Plants bushy and possessing multiple attachment points; branching dense and irregular to opposite, in many planes. Clumps to 10 cm in diameter, 6 cm high. Segments 10 mm broad to 5 mm high, reniform, ribbed and trilobed at base of plant. Colour light to dark green, basal segments often white. Cortical utricles small, rounded and slightly adhering in surface view 10–12 μm in diameter. Secondary utricles slender and fork-shaped, arising as dichotomies of the medullary filaments.

Distribution

Tropical Pacific and Indian Oceans.

Rotuman Distribution

Fapufa (F1); *Hoféa* (H46, H82, H105, H110, 111, H200, H202, H206, H219, 220); *Oinafa* (O15, O23, O36, 37, O40, 41, O43, O45, O47, O49, O53/ USP 397, O56, O59, O71, 72, O75); *Tua'koi* (T1/ USP 399, T2).

Habitat and Remarks

Most common *Halimeda* sp. on Rotuman reefs, found at all sites and often in exposed places (e.g. edge of reef) where its low-profile habit and strong attachment mode offer a distinct advantage over other species. In sheltered, sandy sites (e.g. *Isilepi* at Hapmafau) this species forms large clumps up to 1 m in diameter in shallow water, often in association with epiphytic *Caulerpa racemosa* and *C. serrulata*.

Halimeda opuntia (Linnaeus) Lamouroux var. ***hederacea*** (Barton) Hillis 1959: 360, pl. 2, fig. 7; pl. 5, fig. 4; Taylor 1950: 81, pl. 40, fig. 1; Dawson 1956: 42; 1957: 109; Payri and Meinesz 1985*a*: 509; Lewis 1987: 31.

Halimeda opuntia f. *hederacea* Barton 1901: 21, pl. 2, fig. 23 (type locality: Indonesia).

Halimeda opuntia forma Taylor 1950: 83.

?Halimeda incrassata f. distorta Yamada 1941: 119, fig. p. 120; Yamada 1944: 28, pl. 4.

(Figs 70*c*, 84)

Plants bushy and loose in habit, with multiple holdfasts, forming distinctive net-like complexes. Heavily calcified, light green to white in colour. Does not form clumps, but rather assumes a creeping or hanging habit. Segments up to 6 mm broad and 5 mm high, trilobed at base of plant, becoming reniform to oval at outer portions, very slightly ribbed. Peripheral utricles hexagonal in surface view, 24–27 μm in diameter.

Distribution

Fiji, Marshall Islands, Tahiti, northern Australia, Indonesia.

Rotuman Distribution

Hoféa (H35/ USP 400, H36, H75, H92, H102, H103/ USP 398, H104, H106, 107, H211); Mea (M2); Oinafa (O10).

Habitat and Remarks

This variety is less common and is often found creeping on the sides of sandy tidal pools or hanging from coral ledges. Habit tending to spread out or hang rather than being upright.

Halimeda simulans Howe 1907: 503, pl. 29 (type locality: Culebra Island, Puerto Rico); Hillis 1959: 368, pl. 3, fig. 4, pl. 5, fig. 27; pl. 6, fig. 15; pl. 11; Taylor 1960: 180, pl. 24, fig. 4; Chapman 1961: 129, fig. 149; Valet 1968: 48, pl. 11, fig. 3; Womersley and Bailey 1970: 283; Woelkerling 1976: 96, fig. 51; Chapman 1977: 162; Tsuda and Wray 1977: 98; Hillis-Colinvaux 1980: 103, fig. 26; Payri and Meinesz 1985*a*: 509; 1985*b*: 644, figs 27, 30, 33, 50; Trono 1986: 235, fig. 36; Lewis 1987: 31; Silva *et al.* 1987: 116; Garrigue and Tsuda 1988: 60; Tsuda 1991: 43; Tsuda and Kamura 1991: 63, pl. 2, figs 1, 2; Coppejans and Prud'homme van Reine 1992*a*: 176 (as '*Halimeda ad simulans* Howe'); South and Yen 1992: 127; Verheij and Prud'homme van Reine 1993: 138, pl. 6, fig. 7.

Halimeda incrassata (Ellis et Solander) Lamouroux *var. simulans* (Howe) Børgesen 1913: 114, fig. 92.

(Figs 76, 85)

Plants up to 9 cm tall, relatively heavily calcified. Colour dull greenish-cream. Branching di- to tetrachotomous; basal region well-developed, up to 15 mm high. Segments up to 8 mm broad and 6 mm high, frequently ribbed, trilobed at base and becoming subcuneate to reniform at outer portions. Peripheral utricles hexagonal in surface view, 26–27 μm in diameter. Secondary utricles up to 27 μm broad, supporting up to 3 primary utricles.

Distribution

Tropical Pacific Ocean.

Fijian Records

Kasahara 1985: 22, pl. 3, fig. 1; pl. 14, fig. *D*; Kasahara 1988; South 1992: 10, figs 29–31; South and Kasahara 1992: 51.

Rotuman Distribution

Hoféa (H6/ USP 401, H213); Hapmafau (HAP1, HAP7); Oinafa (O1, O30, O34, O57, O64-65).

Habitat and Remarks

Found in sandy patches on inner reef flat and bottom of tidal pools.

Halimeda taenicola W.R. Taylor 1950: 86, pl. 46, fig. 1 (type locality: Rongerick, Enyvetik Island, Marshall Islands); Dawson 1956: 42; 1957: 109; Hillis 1959: 354, pl. 2, fig. 6; pl. 5, fig. 12; pl. 6, fig. 14; pl. 14; pl. 11; Trono 1968: 182, pl. 16, fig. 3; Womersley and Bailey 1970: 284; Tsuda and Wray 1977: 99; Hillis-Colinvaux 1980: 139, fig. 42; Dong and Tseng 1984: 290, pl. 144, fig. 3; Payri and Meinesz 1985*a*: 509; 1985*b*: 645, figs 28, 31, 34, 51; Trono 1986: 236, fig. 37; Lewis 1987: 32; Silva *et al.* 1987: 116; Garrigue and Tsuda 1988: 60; Coppejans and Prud'homme van Reine 1992*a*: 176; Verheij and Prud'homme van Reine 1993: 139, pl. 6, fig. 8; Wynne 1993: 23, fig. 12.

(Figs 72, 74, 86)

Plants up to 8 cm tall, with small holdfast and monoplanar branching. Lower segments joined, upper segments up to 8 mm broad and 10 mm high, deltoid to reniform, thick. Colour light green to yellowish cream. Peripheral utricles hexagonal in surface view, 28–32 μm in diameter. Secondary utricles up to 120 μm long, somewhat inflated and slender.

Distribution

Tropical Pacific and Indian Oceans.

Fijian Records

Garbary *et al.* 1991: 252; South 1992: 10, figs 32, 33; South and Kasahara 1992: 51.

Rotuman Distribution

Hapmafau (HAP6); *Oinafa* (O3, O7/ USP 403, O9, O11/ USP 402).

Habitat and Remarks

Found at the bottom of tidal pools and surge inlets, often in association with epiphytic *H. micronesica*. Also found in sandy patches with moderately strong current.

Halimeda tuna (Ellis et Solander) Lamouroux 1812: 186; 1816: 309, pl. X1, fig. 8; Dickie 1876: 244; Barton 1901: 11, pl. 1, figs 1–6; Weber-van Bosse 1913*a*: 120; Okamura 1932(1929–1932): 70, pl. 285, figs 1–4 (f. *typica* Barton); Gilbert 1946: 78; 1947: 124; Taylor 1950: 84, pl. 43, fig. 2; 1960: 178, pl. 24, fig. 5; 1966: 364; Hillis 1959: 342, pl. 1, 5, 6, 9; Chapman 1961: 130, fig. 150; Durairatnam 1961: 25; Trono 1968: 182, pl. 16, fig. 2; Valet 1968: 47; Womersley and Bailey 1970: 284; Jaasund 1976: 31, fig. 61; Chapman 1977: 161 162; Tsuda and Wray 1977: 99; Sartoni 1979: 286, fig. 5*c*; Hillis-Colinvaux 1980: 122, fig. 35; Payri and Meinesz 1985*a*: 509; Trono 1986: 236, fig. 38; Lewis 1987: 32; Santelices and Abbott 1987: 5; Silva *et al.* 1987: 116; Garrigue and Tsuda 1988: 60; Abbott 1989: 226; Littler *et al.* 1989: 88; Tsuda 1991: 43; Tsuda and Kamura 1991: 69, pl. 3, fig. 5; Coppejans and Prud'homme van Reine 1992*a*: 176; Ohba and Enomoto 1992: 29; South and Yen 1992: 127; Verheij and Prud'homme van Reine 1993: 139, pl. 6, fig. 9; Wynne 1993: 23, fig. 13.

Corallina tuna Ellis et Solander 1786: 111, pl. 20, fig. *e* (type locality: Mediterranean Sea).

?*Halimeda tuna* f. *albertisii* Piccone 1879: 23, fig. 2.

Halimeda tuna f. *platydisca* (Decaisne) Barton 1901: 14, pl. 1, fig. 2.

Halimeda tuna var. *platydisca* Børgesen 1911: 134.

(Figs 73, 75, 87, 88)

Plants up to 13 cm tall, often with holdfast up to 40 mm long. Lightly calcified, basal segments rather more whitish than rest of plant, usually light to dark green and shiny. Basal segments reniform to deltoid, up to 20 mm broad and 10 mm high. Outer segments smaller, deltoid to subcuneate, up to 5 mm broad and 7 mm high. Cortical utricles hexagonal in surface view, about 40 μm in diameter. Secondary utricles somewhat inflated, di- to trichotomously branched.

Distribution

Tropical Indian and Pacific Oceans.

Fijian Records

Chapman 1971: 166 1977; Kasahara 1985: 23, pl. 2, fig. 1; Kasahara 1988; South 1992: 10, figs 35–38; South and Kasahara 1992: 51.

Rotuman Distribution

Hoféa (H2, H4, 5, H7–9, H13–17, H19–23, H25–27, H37, H39/ USP 406, H42, H44, H48, H50–53, H55–59, H63, 64, H67–72, H76–78, H80, 81, H83–87, H89, H94, H96, H98, H109, H203–205, H207/ USP 404, H208/ USP 405, H209, H210, H212, H216–218); Hapmafau (HAP3, HAP5); Mea (M3); Oinafa (O2, O4, O6, O12–14, O16, O18, 19, O21, 22, O24–26, O32, O35, O38, O42, O44, O46, O48, O51, 52, O54, O61–63, O66, O68, 69, O73, O78).

Habitat and Remarks

Very common plant of the northern Rotuman reefs, from Mea to Oinafa. Found at bottom of tidal pools and rock crevices, often within the protection of *Melanamansia glomerata* mats.

Udoteaceae

Avrainvillea Decaisne 1842

Key to the Rotuman Species of *Avrainvillea*

1. Blade oblong to subcuneate; habit gregarious ..... *A. amadelpha*
1: Blade peltate; habit solitary ..... *A. rotumensis*

Avrainvillea amadelpha (Montagne) Gepp et Gepp 1911: 139, pl.14, figs 114, 115; Tsuda and Wray 1977: 93; Olsen-Stojkovich 1985: 36, fig. 19; Garrigue and Tsuda 1988: 56; Brostoff 1989: 166, figs 1, 2; Coppejans and Prud'homme van Reine 1989: 121, pl. 1, figs 1–17; 1992*a*: 177; Verheij and Prud'homme van Reine 1993: 129, pl. 4, fig. 3.

Udotea amadelpha Montagne 1857: 136 (type locality unknown).

Chloroplegma sordidum Zanardini 1858: 290, tab XIII fig. 1 (type locality: Red Sea).

Avrainvillea lacerata var. *robustior* Gepp et Gepp 1911: 139, pl. 13, figs 108, 109 (type locality: Bapon, Singapore); Weber-van Bosse 1913: 115; Taylor 1950: 70; Dawson 1957: 108, fig. 11*b*; Valet 1968: 50, pl. 10, fig. 6; Womersley and Bailey 1970: 280.

(Fig. 50*a*, *b*)

Plants dark-green and velutinous, gregarious in habit, up to 2 cm high and 1.7 cm broad, with broadly flattened and spongy oblong to subcuneate flabellar blade borne on a stalk up to 4 mm long and 2 mm wide. Blade upright, stipe flattened in cross section; the holdfast developed into an extensive emergent mat from which many stipes arise. Cortical filaments 16–34 μm in diameter, dichotomously branched with equal constrictions just above dichotomies. Siphons hyaline and cylindrical in cortex, torulose and felted in pseudocortex.

Distribution

Fiji, New Caledonia, Eastern Micronesia, northern Polynesia, Solomon Islands, Indonesia, East Africa.

Fijian Records

Kasahara 1988; South and Kasahara 1992: 51.

Rotuman Distribution

Fapufa (F2/ USP 333).

Habitat and Remarks

Single clump of plants found growing on the rim of an elevated rocky tide pool at Fapufa's Afoa Point, sheltered from wave action and in association with *Caulerpa racemosa*. The base of the *Avrainvillea* was host to a cover of *Lobophora variegata*.

Avrainvillea rotumensis N'Yeurt, Littler et Littler 1996 (type locality: Hofëa, Rotuma Island).

(Figs 51*a–d*, 53, 56)

Thalli to 10 cm tall, olive-green, solitary; mature blades peltate, 9 cm in diameter, 4 mm thick, smooth, concentric zonation faint, blade margins smoothly rounded, not lobed or ragged, to 2 mm thick; stipe to 6 cm long, 2 cm in diameter, cylindrical, seldom branched; anchored by bulbous, fibrous rhizoidal system. Medullary siphons of blade 20–40 μm in diameter, moniliform, weak-walled; surface siphons of blade taper abruptly to 8 μm in diameter, moniliform to tortuous, dichotomies wide-spreading; apices rounded, hooked or tortuous, forming loose cortex; siphons of growing margin 30–40 μm in diameter, moniliform, tapering to 20 μm in diameter; medullary siphons of stipe 50–80 μm in diameter, moniliform; cortical siphons of stipe tapering to 8–15 μm in diameter, moniliform to tortuous, often hyaline; rhizoids moniliform, tortuous to cylindrical, 20–50 μm in diameter tapering to 10 μm in diameter.

Rotuman Distribution

Hofëa (H230/ !USP 615; H231/ USP 622).
(! = type specimen)

Habitat and Remarks

Growing 1.5–3 m depth, at the mouth of a passage on outer reef; anchored in carbonate sediments. Specimens of this alga were confirmed as representing a new species by D.S., and M.M. Littler of the Smithsonian Institution, and it is described by N'Yeurt *et al.* (1996). It is characterised by being the only truly peltate form of the genus, and hence easily recognisable in the field).

Chlorodesmis Harvey et Bailey 1851: 373

Key to the Rotuman Species of *Chlorodesmis*

1. Plants up to 6 cm high; filaments 95–130 μm in diameter ..... *C. hildebrandtii*
1: Plants up to 15 cm high, filaments 140–182 μm in diameter ..... *C. major*

Chlorodesmis hildebrandtii A. Gepp et E.S. Gepp 1911: 16, pl. 8, figs 74, 75 (lectotype locality: Johana (Anjouan) Island, Comoro Island, *fide* Ducker 1967: 165); Weber-van Bosse 1913*a*: 114; Gilbert 1947: 122; 1961: 442; Egerod 1952: 377, pl. 34*a*, figs 9*a, b, d*; Dawson 1954: 394, fig. 11*f, g*; Tsuda 1964: 5; Taylor 1966: 352; Ducker 1967: 164, pl. 6, fig. 16; Trono 1968: 173, pl. 13, figs 1–3; Jaasund 1976: 27, fig. 55; Tsuda and Wray 1977: 95; Magruder and Hunt 1979: 21; Dong and Tseng 1984: 286, pl. 142, fig. 3; Ngan and Price 1979: 6; Trono 1986: 224, fig. 24; Lewis 1987: 27; Silva *et al.* 1987: 118; Abbott 1989: 226; Coppejans and Prud'homme van Reine 1989: 129, pl. 3, figs 5–11; 1992*a*: 177; Verheij and Prud'homme van Reine 1993: 133, text fig. 4*b*; Wynne 1993: 22.

(Figs 54, 63)

Thallus light green and fluffy in water, up to 6 cm tall and composed of many free, hair-like cylindrical filaments 95–130 μm in diameter, with repeated symmetrical dichotomous (and sometimes trichotomous) branching. Supporting filaments truncated at point of branch constrictions; the constrictions equal just above dichotomies. Basal translucent rhizoids irregularly branched, 86–115 μm in diameter.

Distribution

Fiji, Micronesia, Hawaii, northern Australia, Indonesia, Philippines, Vietnam, China, Maldives.

Fijian Records

Garbary *et al.* 1991: 252; South and Kasahara 1992: 52; Raj 1993: 54, figs 25–26.

Rotuman Distribution

Lopta (L15/ USP 339, *L24).

Habitat and Remarks

Common at all sites, either attached to staghorn coral rubble in middle reef, or to rocks in the backreef. This species is intermediate between *Chlorodesmis fastigiata* and *C. major* (see Ngan and Price 1979).

Chlorodesmis major Zanardini 1874: 504 (type locality: Lord Howe Island); J. Agardh 1887*a*: 51; A. Gepp and E.S. Gepp 1911: 16; Okamura 1932(1929–1932): 61; Lucas 1935: 200; Egerod 1952: 377, fig. 9*c*; Ducker 1967: 167, pls 7–8, 17–18; Lewis 1987: 27; Silva *et al.* 1987: 118; Millar and Kraft 1994*b*: 435.

Chlorodesmis torresiensis W.R. Taylor 1945: 66 (type locality: Murray Island, Torres Strait, Australia); Taylor 1966: 352.

(Figs 55, 57)

Thallus dark-green, coarse and up to 15 cm high and 10 cm broad, with small stipe. Filaments 140–182 μm in diameter, truncated at dichotomies with equal constrictions. Rhizoidal basal system 100–130 μm in diameter, with numerous constrictions.

Distribution

Fiji, Lord Howe Island, Hawaii, northern Australia, Indonesia, Philippines.

Fijian Record

New record for Fiji.

Rotuman Distribution

Hapmafau (HAP21/ USP 340).

Habitat and Remarks

Found on the back reef, typically within the protection of coral rubble or attached to exposed beach rocks (e.g. at Hapmafau). This species is very similar to *Chlorodesmis hildebrandtii*, except for the larger diameter of the filaments (>140 μm; *vide* Ducker 1967).

Rhipidosiphon Montagne 1842

Rhipidosiphon javensis Montagne 1842*a*: 14, 15 (type locality: Java, Indonesia); Littler and Littler 1990: 35; Verheij and Prud'homme van Reine 1993: 140, pl. 7, fig. 6; Wynne 1993: 23, fig. 14.

Udotea javensis (Montagne) A. Gepp and E.S. Gepp 1904: 363; Weber-van Bosse 1913*a*: 116; Yamada and Tanaka 1938: 62; Gilbert 1947: 122; Taylor 1950: 73; Egerod 1952: 379, fig. 10; Dawson 1954: 395, fig. 13*b, c*; 1956: 40; 1957: 108; 1961: 445; Trono 1968: 187; Valet 1968: 51; Womersley and Bailey 1970: 280; Jaasund 1976: 29, fig. 60; Tsuda and Wray 1977: 100; Sartoni 1979: 292, fig. 8*c*; Dong and Tseng 1984: 294, pl. 146, fig. 2; Payri and Meinesz 1985*a*: 510; Lewis 1987: 34; Silva *et al.* 1987: 119; Garrigue and Tsuda 1988: 61; Abbott 1989: 226; Tsuda 1991: 43; Coppejans and Prud'homme van Reine 1989: 139, pl. 10, figs 3–9; 1992*a*: 178.

(Fig. 61)

Thallus yellow-green, up to 7 mm high and 5 mm broad, fan-shaped blade rounded at outer margins and cuneate at base. Thallus consisting of a single layer of parallel filaments 35–40 μm broad (outer margins) to 80–105 μm broad (base of thallus) with characteristic unequal constrictions above each dichotomy. Stipe up to 200 μm in diameter, filamentous and uncorticated, mostly uncalcified and monosiphonous. Stipe anchored by fine, translucent hyaline rhizoids.

Distribution

Tropical Pacific and Indian Oceans, Caribbean.

Fijian Records

Kasahara 1985: 24; 1988 (as *Udotea javensis*); South 1991: 5; South and Kasahara 1992: 52.

Rotuman Distribution

Tua'koi (*T12/ USP S5: 16).

Habitat and Remarks

Middle reef, epiphytic on *Dictyota friabilis*. This genus has been re-established by Littler and Littler (1990), for the widespread *Udotea javensis* (Montagne) A. Gepp and E.S. Gepp. They note that the anastomosing siphons reported by Montagne (1842*a*) as characteristic of *Rhipidosiphon javensis* is incorrect, and that the latter genus differs from *Udotea* by its monosiphonous and partly uncalcified stipe. They consider that Gepp and Gepp's (1904) placement of *Rhipidosiphon javensis* within the genus *Udotea* is based on insufficient derived characters.

Rhipilia Kützing 1858

Rhipilia orientalis A. et E.S. Gepp 1911: 57, pl. 16, figs 134–136; Weber-van Bosse 1913*a*: 115; Taylor 1950: 72, pl. 36, fig. 1; Dawson 1956: 40; 1957: 108; Moul 1957: 44; Trono 1968: 177, pl. 19, fig. 1; Womersley and Bailey 1970: 279; Tsuda and Wray 1977: 99; Lewis 1987: 33; Coppejans and Prud'homme van Reine 1989: 131, pl. 6, figs 1–18; Verheij and Prud'homme van Reine 1993: 140, pl. 7, fig. 2.

(Figs 52*a, b*, 62, 64*a–c*)

Thallus up to 35 mm high, composed of a stipitate blade up to 30 mm broad tapering into a stalk up to 15 mm long and 2 mm in diameter. Blade siphons 20–35 μm in diameter, with alternate appendages up to 147 μm long terminating in 2–4 irregular prongs.

Distribution

Indonesia, Micronesia, Solomon Islands, north Australia.

Rotuman Distribution

Ropure (R5/ USP 619); Hoféa (USP 777).

Habitat and Remarks

Growing in sandy tidal pools on outer reef, at 1–2 m.

Dasycladales

Dasycladaceae

Neomeris Lamouroux 1816

Neomeris vanbosseae Howe 1909: 80, pl. 1, figs 4, 7; pl. 5, figs 17–19 (*'van bosseae'*) (type locality: Sikka, Flores, Indonesia); Weber-van Bosse 1913*a*: 88; Gilbert 1943: 17; Egerod 1952: 405, pl. 41, fig. 22*b*; Chapman 1955: 355; Gilbert 1961: 434; Taylor 1966: 347; Trono 1968: 191; Valet 1968: 52; 1969: 596, pl. 146, figs 2, 5; pl. 153, figs 4–7 10–12 14; Womersley and Bailey 1970: 287; Jaasund 1976: 9, fig. 20; Tsuda and Wray 1977: 99; Dong and Tseng 1984: 268, pl. 133, fig 2; Payri and Meinesz 1985*a*: 510; Trono 1986: 55, fig. 56; Heijs 1987: 152; Lewis 1987: 36; Silva *et al.* 1987: 121; Garrigue and Tsuda 1988: 60; Tsuda 1991: 43; Coppejans and Prud'homme van Reine 1992*a*: 178; Verheij and Prud'homme van Reine 1993: 147.

Neomeris dumetosa Sonder 1871 (*fide* Valet 1969: 596).

(Figs 58, 90)

Plants cylindrical, up to 20 mm tall and 4 mm in diameter, in a broad, 120–130° curve. Basal portion whitish and moderately calcified, upper portion light to dark green with hairlike whorls of radial branchlets at the tip. Inner structure with persistent stalk cells 525–575 μm long, bearing paired deciduous cortical assimilatory cells, elongated below about 200 μm, truncate-capitate above; broadly conical to 125 μm in diameter and giving rise terminally to deciduous, segmented monomorphous hairs 0.5–1.0 mm long. Gametangia 75–100 μm in diameter, bearing a single spherical cyst at the end of a stalk cell between paired diamond-shaped assimilatory cells.

Distribution

Tropical oceans.

Fijian Records

Chapman 1971: 165; Kasahara 1985: 40, pl. 6, fig. 7; South 1991: 6; South and Kasahara 1992: 53.

Rotuman Distribution

Lopta (L16/ USP 341); Tua'koi (T5/ USP 342).

Habitat and Remarks

Grows either singly or gregariously below ledges or within rock crevices and at bases of large boulders in middle and back reef locations.

Polyphysaceae

Polyphysa Lamarck 1816: 151

Polyphysa parvula (Solms-Laubach) Schnetter et Bula-Meyer 1982: 42, pl. 7, figs *c–f* (type locality: Celebes, Indonesia); Coppejans and Prud'homme van Reine 1992*a*: 178; Millar and Kraft 1994*b*: 439.

Acetabularia parvula Solms-Laubach 1895: 29, pl. 2, figs 3, 5 (syntype localities: 'Tropical India'; Macassar; Celebes; Indonesia); Taylor 1950: 50; Chapman 1955: 355; Valet 1969: 621, pl. 11, figs 1–7; pl. 12, fig. 7; pl. 19, figs 2–4; pl. 20, figs 5–8; pl. 22, figs 1, 4, 7; pl. 29; pl. 38, figs 1, 4, 5; pl. 45, figs 5–7; Womersley and Bailey 1970: 287; Tsuda and Wray 1977: 93; Dong and Tseng 1984: 268, pl. 133, fig. 4; Lewis 1987: 37; Silva *et al.* 1987: 122; Tsuda 1991: 40.

Acetabularia moebii Solms-Laubach 1895: 30, pl. 4 fig. 1 (type locality: Mauritius); Børgesen 1951: 6, figs 1, 2; Egerod 1952: 411, fig. 23*i*; Dawson 1954: 397, fig. 13*j*; 1956: 43; 1957: 110; Tsuda 1964: 4 ('mobii'); Trono 1968: 192; Tsuda and Wray 1977: 93; Payri and Meinesz 1985*a*: 506; Trono 1986: 243, fig. 48 (*'mobii'*); Lewis 1987: 37; Abbott 1989: 226 (*'mobii'*).

Acetabularia minutissima Okamura 1912(1909–1912): 184 pl. 100, figs 7–11 (*sensu* Valet 1969: 622).

Acetabularia polyphysoides Okamura (*non* Crouan) 1913: 21 (*sensu* Valet 1969: 622).

Acetabularia wettsteinii Schussnig 1930: 338; J., and G. Feldmann 1947: 81, figs 1, 2 (*sensu* Valet 1969: 622).

(Fig. 89)

Plants up to 6 mm high, with a monoplanar reproductive disc 2.5–3 mm in diameter, borne atop a slender stalk. Disc composed of 14 cylindrically clavate segments with rounded apices, the segments loosely joined together by light calcification. Corona superior present, corona inferior lacking.

Distribution

Fiji, Micronesia, Tuvalu, Solomon Islands, Tahiti, northern Australia, Philippines, Japan, China.

Fijian Records

Garbary *et al.* 1991: 252 (as *Acetabularia moebii* Solms-Laubach).

Rotuman Distribution

Hapmafau (*HAP52/ USP S6: 13).

Habitat and Remarks

Found attached to coral debris in the lagoon, in association with *Meristotheca procumbens* P. Gabrielson et Kraft. This species was transferred to the genus *Polyphysa* by Schnetter and Bula-Meyer (1982: 42). The main distinguishing features between *Acetabularia* (Lamouroux 1812: 185) and *Polyphysa* are the lateral unison of gametangial rays and the presence of an inferior corona in *Acetabularia*, and mostly free or loosely united gametangial rays and the absence of an inferior corona in *Polyphysa* (Womersley 1984: 295). The Rotuman plants agree with the latter description.

Phaeophyceae

Ectocarpales

Ectocarpaceae

Hincksia J.E. Gray 1864

Hincksia breviarticulata (J. Agardh) P.C. Silva in Silva *et al.* 1987: 73; Abbott 1989: 226; Wynne 1993: 19.

Ectocarpus breviarticulatus J. Agardh 1847: 7 (type locality: 'St. Augustin' (Oaxaca, Mexico)); Dickie 1874; Børgesen 1914: 173, fig. 136; Setchell 1924: 171, fig. 37; Yamada and Tanaka 1938: 66; Dawson 1954: 398, fig. 14*a, b*; 1956: 43; 1957: 110; Taylor 1960: 201; Durairatnam 1961: 32, pl. 6, figs 10, 11; Chapman 1963: 9, fig. 3; Kuckuck 1963: 362, figs 1–3; Trono 1969: 25; Womersley and Bailey 1970: 288; Tsuda 1972: 90, pl. 1, fig. 1; pl. 2, fig. 1; 1976: 328; Chapman 1977: 162; Tsuda and Wray 1977: 101; Reyes 1980: 119, pl. 1, fig. 2*a, b*; Lu and Tseng 1984: 168, pl. 85, fig. 1; Lewis 1985: 3; Payri and Meinesz

1985*a*: 505; Lewis and Norris 1987: 11; Santelices and Abbott 1987: 6; Tsuda 1991: 44; South and Yen 1992: 128.

Giffordia breviarticulata (J. Agardh) Doty et Albert (*nomen nudum*) ex Magruder and Hunt 1979: 45.

(Figs 95, 98*a–e*)

Plants yellow-brown, tufted, 20–35 mm high, with irregular primary branching and numerous hooked secondary branchlets which hold the filaments in rope-like spongy strands. Filaments about 25 μm thick, composed of rectangular cells about up to 25 × 50 μm. Secondary hook-like branchlets up to 800 μm long and 25 μm broad, arising at 85–90° to main filaments and spaced at 500–700 μm intervals. Plurilocular sporangia 40–45 μm high, short and pyriform, containing about 8 spores and borne on a stalk cell.

Distribution

Fiji, Caroline Islands, Micronesia, Hawaii, Nauru, Tahiti, Easter Island, Philippines, Taiwan, Ryukyu Islands, Vietnam, China, Ceylon, Maldives, tropical Americas, Europe.

Fijian Record

New record for Fiji.

Rotuman Distribution

Lopta (L19/ USP 357, *L26, *L27, *L28/ USP S6: 7).

Habitat and Remarks

Grows as small tangled tufts on the outer reef crest, often attached to seaward-facing rocks exposed to heavy wave action (e.g. at Lopta).

Sphacelariales

Sphacelariaceae

Sphacelaria Lyngbye 1819

Sphacelaria rigidula Kützing 1843: 292 (type locality: Red Sea); Lewis 1984: 8; Silva *et al.* 1987: 74; Womersley 1987: 166, figs 51*d*, 54*a–g*; Garrigue and Tsuda 1988: 63; Abbott 1989: 226; Tsuda 1991: 46; Millar and Kraft 1994*a*: 14.

Sphacelaria furcigera Kützing 1855: 27, pl. 90, fig. 11 (Type locality: Karak (Khark) Island, Iran) (*vide* Prud'homme van Reine 1982: 203, figs 508–554; Silva *et al.* 1987: 74); Weber-van Bosse 1913*a*: 135; Børgesen 1914: 40; 1926: 72; 1941: 46, fig. 21; Dawson 1954: 400, fig. 14*h*; 1956: 44; 1957: 110; Taylor 1960: 210, pl. 29, fig. 5; Durairatnam 1961: 31, pl. 6, figs 4–7; Meñez 1961: 59, pl. 9, figs 103, 104; pl. 10, figs 105–108; pl. 12, figs 126–127; Chapman 1963: 15, fig. 9; Earle 1969: 144, fig. 31; Trono 1969: 28, pl. 1, fig. 6; Womersley and Bailey 1970: 290; Tsuda 1972: 93, pl. 1, fig. 4; Dawes 1974: 99; Jaasund 1976: 37, fig. 75; Woelkerling 1976: 110, fig. 113; Tsuda and Wray 1977: 102; Lu and Tseng 1984: 202, pl. 102, fig. 2; Lewis 1985: 8; Payri and Meinesz 1985*a*: 506; Lewis and Norris 1987: 11 (var. *tenuis* Yamada).

(Fig. 99*a, b*)

Thallus light-brown, 7–10 mm high, epiphytic, forming erect penicillate tuft; basal holdfast discoid. Branching sparse to frequent, at irregular narrow angles. Main axis linear and 2 cells thick, 30–35 μm in diameter with rectangular cells about 15 × 35 μm. Propagula

abundant, with paired slender and slightly tapering arms 100–250 μm long and 15–20 μm broad with an approximate angle of 120° between them, borne on a pedicel 230–260 μm long and with a convex lenticular apical cell rising to 7.5–18 μm. Lateral unilocular sporangia subspherical and shortly pedicellate, 37–40 μm in diameter.

Distribution

Tropical Indian and Pacific Oceans.

Fijian Records

Garbary *et al.* 1991: 253 (as *S. furcigera* Kützing); South and Kasahara 1992: 53 (as *S. furcigera* Kützing).

Rotuman Distribution

Maka Bay (*MAK11/ USP S6: 5).

Habitat and Remarks

Epiphytic on the base of *Sargassum polycystum*, in sheltered back reef locations at Maka Bay.

Dictyotales

Dictyotaceae

Dictyopteris Lamouroux 1809

Dictyopteris repens (Okamura) Børgesen 1924: 265, fig. 13; Okamura 1931(1929–1932): 47, pl. 275, figs 17–27; 1931: 103; Yamada and Tanaka 1938: 67; Dawson 1956: 44, fig. 34; 1957: 110, fig. 10; Trono 1969: 31; Womersley and Bailey 1970: 291; Tsuda 1972: 94, pl. 3, fig. 1; Tsuda and Wray 1977: 101; Allender and Kraft 1983: 107, fig. 19*A, B*; Lu and Tseng 1984: 190, pl. 96, fig. 4; Lewis 1985: 10; Lewis and Norris 1987: 11; Santelices and Abbott 1987: 6; Silva *et al.* 1987: 75; Abbott 1989: 227; Tsuda 1991: 44; Ohba and Enomoto 1992: 29; Verheij and Prud'homme van Reine 1993: 150, pl. 9, fig. 1; Millar and Kraft 1994*a*: 16.

Haliseris repens Okamura 1916: 8, fig. 3; pl. 1, figs 7–18 (type locality: Truk Island, Caroline Island).

Neurocarpus repens Okamura 1916: 8.

(Figs 91, 92)

Fronds recumbent, up to 3 cm long, branching dichotomous with branches 1–3 mm broad; thallus distromatic, 65 μm thick, with a prominent midrib 4–8-cells thick.

Distribution

Tropical Pacific and Indian Oceans.

Fijian Records

Garbary *et al.* 1991: 253; South and Kasahara 1992: 53.

Rotuman Distribution

Lopta (*L46/ USP S5: 18); Tua'koi (*T10/ USP S5: 10).

Habitat and Remarks

Found associated with *Dictyota friabilis* at base of staghorn coral rubble.

Dictyota Lamouroux 1809

Dictyota friabilis Setchell 1926: 91, pl. 13, figs 4–7, pl. 20, fig. 1 (type locality: Tafaa Point, Tahiti); Dawson 1954: 401, fig. 16*a, b*; Tsuda 1964: 7; Tsuda and Trono 1968: 195; Trono 1969: 29; Jaasund 1970*c*: 75, figs 2*D*, 3*D*; Womersley and Bailey 1970: 290; Tsuda 1972: 96, pl. 4, fig. 3; Jaasund 1976: 39, fig. 79; Tsuda and Wray 1977: 101; Magruder and Hunt 1979: 43; Lu and Tseng 1984: 194, pl. 98, fig. 1; Payri and Meinesz 1985*a*: 505; Silva *et al.* 1987: 76; Abbott 1989: 227; Ohba and Enomoto 1992: 29.

(Figs 93, 94, 100, 101)

Thallus imbricating, prostrate and friable, flat and membranous; individual fronds spreading to 3 cm in diameter. Colour yellowish brown, with irregular dichotomous branching and entire margins, contiguous segments mutually attached by bundles of rhizoids. Apices rounded, with prominent paired apical cells. Angle of branching about 45–100°; segments up to 5 mm broad, tapering at base. Thallus tristromatic, about 125 μm thick with epidermal cells 25 μm tall and medullary cells 75 μm tall with lenticular thickenings. Sporangia 55–60 μm in diameter, scattered along middle portion of both surfaces of thallus.

Distribution

Fiji, Marshall Islands, Kiribati, Solomon Islands, Tahiti, Papua New Guinea, Hawaii, Baker and Howland Islands, Philippines, Vietnam, China, Tanzania.

Fijian Records

Ajisaka and Enomoto 1985: 37, figs 1, 5; South and Kasahara 1992: 54.

Rotuman Distribution

Fapufa (*F5/ USP S5: 9), Hapmafau (HAP25/ USP 354, *HAP60/ USP S7: 5); Tua'koi (*T11/ USP S5: 8).

Habitat and Remarks

Attached to coral rubble; growing at the base of *Avrainvillea amadelpha* and other larger algae.

Dilophus J. Agardh 1882: 106

Dilophus radicans Okamura 1916: 7, pl. 1, figs 1–6, text figs 1, 2 (type locality: Ponape, Caroline Island); Tsuda and Wray 1977: 101; Lewis and Norris 1987: 12.

(Figs 102–104)

Plants orange-brown, up to 6 cm in length, forming a loosely entangled mass creeping on or entangled in other algae. Fronds narrow, irregularly and distichously alternately branched, ancipito-compressed, up to 900 μm broad and 320–350 μm thick. Tufts of anchoring fibres are emitted from points of attachment on the main axes. Apex of ultimate branches rounded, apical cell prominent, up to 60 μm broad and 35 μm high. In cross-section, thallus composed of 2 distinct layers; a medulla 4 or 5 isodiametric cells thick and 47–70 μm in diameter, and a single cortical layer of rectangular cells up to 30 μm long and 18 μm broad. Reproductive sporangia up to 352 × 176 μm, composed of numerous small spores about 12 μm in diameter. Nearly all ultimate branches on the specimen examined bore sporangia about 700 μm from the apex and centrally positioned on the ventral side of the branches.

Distribution

Fiji, Caroline Islands (Micronesia); Taiwan.

Fijian Records

Garbary *et al.* 1991: 253; South and Kasahara 1992: 54.

Rotuman Distribution

Maka Bay (*MAK15/ USP S5: 7, 863, 864), Fapufa (USP S12: 8).

Habitat and Remarks

Growing entangled with *Sargassum polycystum* in Maka Bay, seaward of the seagrass beds at about 0.6 m depth. Smaller plants found attached to coral, 0.5 m depth in a tidal pool at Fapufa, together with *Padina tenuis*.

The Rotuman plants are in excellent accord with Okamura's description and habit of the Ponape species. North Atlantic species of the genus *Dilophus* have been transferred to *Dictyota* by Hörnig *et al.* (1992), based on a lack of separating characters between members of the two genera. However, work on Pacific species of *Dictyota* and *Dilophus* is still in progress (Prud'homme van Reine, pers. comm.). While it is likely that Pacific members of the genus *Dilophus* should eventually be incorporated into *Dictyota*, until such time as the conspecificity of the two genera in the Pacific is confirmed the name *Dilophus radicans* is retained in the present treatment. *Dilophus* is also retained by Millar and Kraft (1994: 17) for Australian species of that genus.

Lobophora J. Agardh 1894

Lobophora variegata (Lamouroux) Womersley 1967: 22; Womersley and Bailey 1970: 292; Tsuda 1972: 97, pl. 5, fig. 1; Dawes 1974: 102; Tsuda and Wray 1977: 101; Magruder and Hunt 1979: 47; Ngan and Price 1979: 8; Allender and Kraft 1983: 81, fig. 4*G, H*; 5*A, B*; Lu and Tseng 1984: 196, pl. 99, fig. 2; Payri and Meinesz 1985*a*: 505; Lewis 1985: 14; Lewis and Norris 1987: 12; Santelices and Abbott 1987: 6; Silva *et al.* 1987: 77; Garrigue and Tsuda 1988: 62; Abbott 1989: 227; Littler *et al.* 1989: 116 (as crust form); Tsuda 1991: 45; Coppejans and Prud'homme van Reine 1992*a*: 179; Ohba and Enomoto 1992: 29; Verheij and Prud'homme van Reine 1993: 154, pl. 10, fig. 1; Millar and Kraft 1994*a*: 18.

Dictyota variegata Lamouroux 1809*a*: 40 (type locality: Antilles).

Zonaria variegata (Lamouroux) C. Agardh 1817: xx; Dickie 1876: 245; Weber-van Bosse 1913*a*: 175.

Pocockiella variegata (Lamouroux) Papenfuss 1943: 467; Taylor 1950: 97; 1960: 231, pl. 33, fig. 4; 1966: 357; Dawson 1954: 400, fig. 14*k*; Chapman 1955: 355; Dawson 1956: 44 ; 1957: 110; Durairatnam 1961: 34, pl. 7, fig. 9; Chapman 1963: 36, fig. 34*a–b*; Earle 1969: 173, figs 53, 70; Trono 1969: 32, pl. 2, figs 3–5; Jaasund 1976: 43, fig. 88; Woelkerling 1976: 108, figs 99, 100; Womersley 1987: 253.

Gymnosorus variegatus (Lamouroux) J. Agardh 1894: 11, fig. 91*F, G*; 92*A*.

Lobophora nigrescens Sonder 1845: 50.

Pocockiella nigrescens (Sonder) Papenfuss 1943: 467.

(Figs 105, 106)

Fronds phylloid, prostrate to decumbent, broadly flabellate, simply to irregularly lacerate, up to 25 mm long and 15 mm broad, attached by matted rhizoidal holdfasts. Thallus encrusting, yellow-brown in colour, up to 100 μm thick, composed of 5 cell layers; the cells of the central layer (40 μm thick) taller than those of the surrounding cells (15 μm thick). Blade deltoid to ovoid, with a marginal row of cuboidal apical cells about 38 μm thick, giving rise to vertical rows of cells about 19 μm thick. Triangular to ovate sori of sporangia scattered on both surfaces of blade.

Distribution

Tropical Indian and Pacific Oceans, Caribbean.

Fijian Records

Chapman 1971: 167; South and Kasahara 1992: 54.

Rotuman Distribution

Fapufa (*F2/ USP S5: 5); Hapmafau (*HAP33/ USP S5: 3); Lopta (*L23/ USP S5: 4), Tua'koi (T13/ USP 446).

Habitat and Remarks

Epiphytic on the base of larger algae (e.g. *Avrainvillea amadelpha*) or attached to rocks and coral rubble in relatively sheltered middle and back reef areas, widely distributed around the island.

Padina Adanson 1763

Padina tenuis Bory de Saint-Vincent 1827: 590 (type locality: île de France, Mauritius); Womersley and Bailey 1970: 292; Tsuda 1972: 98, pl. 5, fig. 4; Tsuda and Wray 1977: 102; Allender and Kraft 1983: 83, figs 5*D, E*, 6*A*; Payri and Meinesz 1985: 505; Lewis and Norris 1987: 12; Garrigue and Tsuda 1988: 62; South and Yen 1992: 128; Verheij and Prud'homme van Reine 1993: 157, pl. 10, fig. 8; Millar and Kraft 1994*a*: 19.

Padina commersonii Bory 1827: 144; Weber-van Bosse 1913*a*: 178, fig. 51; Yamada and Tanaka 1938: 66; Dawson 1954: 401, fig. 17; 1956: 44; 1957: 110; Taylor 1950: 100, pl. 54, fig. 1; Womersley and Bailey 1969: 436.

Padina boryana Thivy in Taylor 1966: 355, fig. 2 (type locality: Tonga); Jaasund 1976: 45, fig. 91; 1977: 516; Papenfuss 1977: 276; Silva *et al.* 1987: 77; Tsuda 1991: 45.

(Fig. 108*f*)

Fronds lightly calcified, flabellate, 10–25 mm long and 20–30 mm broad, zonate and light-orange to yellowish in colour. Thalli distromatic (sometimes tristromatic at the base), 57–64(75) μm thick. Outer surface cells (18–25) × (21–28) μm, smaller than inner surface cells which measure (18–30) × (50–85) μm. Sporangia 57–64 μm in diameter, in non-indusiate sori occuring in concentric rows midway between hair bands on outer surface of frond.

Distribution

Fiji, Nauru, Solomon Islands, Micronesia, Tonga, French Polynesia, New Caledonia, Ryukyu Islands, Lord Howe Island, Indonesia, Taiwan, Tanzania.

Fijian Records

Kapraun and Bowden 1978: 200; South and Kasahara 1992: 54.

Rotuman Distribution

Solnohu, Juju (USP 869); Fapufa (USP 870, S12: 10).

Habitat and Remarks

Growing in relatively undisturbed shallow locations, attached to coral rubble.

Thivy (in Taylor 1966: 355), Papenfuss (1977: 277), and Silva *et al.* (1987: 78) consider *P. tenuis* to be a misapplied name, allegedly based on C. Agardh's (1824: 264) *Zonaria pavonia* var. *tenuis* (which actually is *Lobophora variegata*), and redescribed the species as *P. boryana* based on type material from Tonga. Womersley and Bailey (1970: 292), after examination of the respective type specimens, more convincingly argue that Bory (1827: 590) based his description on his own material from Mauritius, hence validating the name *P. tenuis*.

Dictyosiphonales

Chnoosporaceae

Chnoospora J. Agardh 1847

Chnoospora minima (Hering) Papenfuss 1956: 69; Taylor 1960: 263, pl. 36, figs 3, 4; 1966: 357; Womersley and Bailey 1970: 293; Tsuda 1972: 101, pl. 6, fig. 5; Magruder and Hunt 1979: 39; Lu and Tseng 1984: 184, pl. 93, fig 2; Lewis 1985: 8; Lewis and Norris 1987: 13; Silva *et al.* 1987: 79; Abbott 1989: 227; Littler *et al.* 1989: 120; Tsuda 1991: 44; Millar and Kraft 1994*a*: 24.

Fucus minimus Hering 1841: 92 (type locality: 'Port Natal' (Durban), South Africa).

Chnoospora atlantica J. Agardh 1847; Dickie 1874*b*.

Chnoospora fastigiata J. Agardh 1848: 171; Børgesen 1941: 63.

Chnoospora pacifica J. Agardh 1847: 7 (type locality: Pacific Mexico); Dawson 1954: 405, fig. 20*c*; Payri and Meinesz 1985*a*: 504.

(Figs 96, 107)

Plants dull brown in colour, stiff and up to 40 mm tall, with main axis repeatedly and fastigiately dichotomously branched. Branches 0.5–1 mm broad, broadened and flattened at points of division. Cryptoblasts 9 μm broad and up to 53 μm long present on older branches, being a characteristic feature of this genus (Fritsch 1945: 112). Plants attached to the substratum by a small discoidal holdfast.

Distribution

Fiji, Solomon Islands, Tahiti, Hawaii, Australia, Vietnam, Philippines, China, Taiwan, Ryukyu Islands, tropical Americas, South Africa.

Fijian Records

New record for Fiji.

Rotuman Distribution

Lopta (L18/ USP 358, *L30, *L31/ USP S5: 6, L38/ USP 479, L39/ USP 478).

Habitat and Remarks

Found on the reef crest, in exposed locations; typically occurring as clumps on the wave-washed rocks or hidden within *Gelidiella acerosa* and *Chondria* mats.

Fucales

Sargassaceae

Sargassum C. Agardh 1820

Key to the Rotuman Species of *Sargassum*

1. Main axis with Y-shaped proliferations ..... *S. polycystum*
1: Main axis without proliferations ..... *S.* sp.

Sargassum polycystum C. Agardh 1824: 304 (type locality: Sunda Strait, Indonesia); Dickie 1874*a*: 190; J. Agardh 1889: 119; Howe 1932: 170; Dawson 1954: 406, fig. 22*t, u*; Durairatnam 1961: 46, pl. 10, figs 14–18; Taylor 1966; Womersley and Bailey 1970: 300; Tsuda 1972: 103, pl. 7, fig. 3; Jaasund 1976: 57, fig. 115; Chapman 1977: 162; Tsuda and Wray 1977: 102; Trono and Ganzon-Fortes 1980: 49; Chou and Chiang 1981: 134, pl. 2, figs 1, 2; Lu and Tseng 1984: 236, pl. 119, fig. 1; Lewis 1985: 24; Trono 1986: 258, fig. 67;

Lewis and Norris 1987: 14; Silva *et al.* 1987: 87; Garrigue and Tsuda 1988: 62; Tsuda 1991: 46; Young-Meng *et al.* 1992: 35, figs 1–4.

(Figs 97, 108*a–c*)

Thallus up to 20 cm tall, colour yellow-brown to dark-brown, attached to substratum by a black, spongy discoid holdfast 6–8 mm in diameter. Main axis 0.5–1.0 mm in diameter, with distinctive short, Y-shaped proliferations up to 1 mm long abundant throughout the plant. Leaves thin, lanceolate with coarsely serrated margins 10–15 mm long and 2–3.5 mm broad, with acute apex, tapering base and distinct midrib. Cryptostomata randomly distributed. Pedunculate vesicles spherical, 2–3 mm in diameter and sometimes tipped with spinose extensions, typically arising solitarily from the base of leaves, and borne on a stalk 2.5–3 mm long. Receptacles not seen.

Distribution

Tropical Indian and Pacific Oceans.

Fijian Records

Chapman 1971: 167; Garbary *et al.* 1991: 253; South and Kasahara 1992: 55; Bishop Museum, Hawaii (BISH 512635, 555177–555179).

Rotuman Distribution

Maka Bay (MAK9/ USP 355).

Habitat and Remarks

Found attached to small rocks and coral in relatively shallow (1–1.5m) and sheltered locations in Maka Bay, just beyond the main *Syringodium isoetifolium* seagrass beds. Often floating and intertwined with *Enteromorpha flexuosa*. The bases of the older *Sargassum* plants are host to tufts of *Sphacelaria rigidula*. The Rotuman plants agree well with the description by Young-Meng *et al.* (1992). This alga is of cultural value to Rotumans, the dried and blackened leaves of the plant being an essential part of the traditional Rotuman dance costume and typically borne as a waist-belt together with a variety of angiosperm leaves and flowers. It is locally known as *pe'pei*.

***Sargassum* sp.**

(Fig. 108*d, e*)

Plants robust, 8–12 cm high, attached to the substratum via a complanate discoid holdfast 1–2 cm in diameter. Main axis terete to slightly compressed, 2.5–3 mm at base and 1.5–2 mm in middle portions, smooth with a knotty appearance from fallen main branches. Main branches slightly compressed, 1–1.5 mm in diameter, issued alternately in all planes. Leaves robust and cartilagineous, oblong-oblanceolate to linear-oblanceolate, (10)20–30 mm long and 4–8 mm wide. Base of leaves acute to acuminate, relatively symmetrical, with irregularly serrate margins and faint midrib. Tip of leaves acuminate; cryptostomata randomly distributed and slightly elevated. Vesicles elliptical to fusiform, 10–17 mm long and 3–5 mm broad, slightly compressed with a filiform coronal leaf. Stalk of vesicles terete to slightly compressed, cryptostomata present. Receptacular branches 4–5 mm long and 0.8–1 mm wide, densely cymose and forked, up to three times equally dichotomously branched. Subtending leaf occasionally present.

Rotuman Distribution

Sumara Point, Fapufa (USP 854, 910).

Habitat and Remarks

Growing in pools on the slopes of exposed rocky cliffs. This alga does not fit any description known to the author, and may represent a new species. It is distinctive because of its robust habit, smooth axes and fusiform to elliptical vesicles tipped with a filiform extension.

Turbinaria Lamouroux 1828

Turbinaria ornata (Turner) J. Agardh 1848: 266; Dickie 1874*a*: 190; Barton 1891: 219; Weber-van Bosse 1913*a*: 149; Okamura 1931: 104; Setchell 1935: 265; Yamada and Tanaka 1938: 67; Taylor 1950: 10; pl. 53, fig. 2; pl. 55, fig. 2; 1963: 483, pl. 3, figs 1–6 (as var. *ornata*); 1966: 358; Dawson 1954: 405; fig. 21; 1956: 44; 1957: 111; Moul 1957: 46; Levring 1960: 122; Durairatnam 1961: 40, pl. 27; Tsuda 1964: 8; Tsuda and Trono 1968: 195; Trono 1969: 37; Womersley and Bailey 1970: 295; Tsuda 1972: 103, pl. 8, figs 1–3; Jaasund 1976: 53, fig. 105; Chapman 1977: 162; Tsuda and Wray 1977: 103; Magruder and Hunt 1979: 55; Lu and Tseng 1984: 242, pl. 122, fig. 1; Lewis 1985: 25; Payri and Meinesz 1985*a*: 506; Trono 1986: 261, fig. 70; Lewis and Norris 1987: 14; Silva *et al.* 1987: 89; Garrigue and Tsuda 1988: 63; Abbott 1989: 227; Tsuda 1991: 46; Coppejans and Prud'homme van Reine 1992*a*: 181; South and Yen 1992: 128; Verheij and Prud'homme van Reine 1993: 162, pl. 12, fig. 7.

Fucus turbinatus Linnaeus var. *ornatus* Turner 1808: 50, pl. 24, figs *c, d* (type locality unknown).

Plants up to 10 cm tall and 5.5 cm broad. Leaves 1–2 cm in diameter, with intramarginal teeth up to 3 mm high. Colour light brown to yellow, robust and attached to substratum by stilt-like haptera up to 2 mm in diameter and 25 mm long. Up to 18 leaves per plant; stems moderately branched. Leaves generally concave; coarse and firm, with terete stalks for about 1/2 their length, terminally distended in a rounded to obpyramidal manner with obtuse ridges. Up to 13 marginal crown teeth on periphery of leaves, and up to 6 often paired erect teeth arranged at about 120° angle over the peripheral surface of the blades.

Distribution

Tropical Indian and Pacific Oceans.

Fijian Records

Chapman 1971: 167; South 1991: 7; South and Kasahara 1992: 55.

Rotuman Distribution

Lopta, Oinafa (O70/ USP 356).

Habitat and Remarks

Plants semi-encrusting, growing mostly on the outer reef crest in moderate to rough exposures. Conspicuous on rocky surfaces by their solitary habit, but sometimes occurring in groups of 3 or 4 plants. Quite prominent at Oinafa and Lopta, being one of the dominant species on the reef crest along with *Chondria sedifolia*, *Gelidiella acerosa* and *Hypnea nidulans*, the latter often competing with *Turbinaria* for space as it is not uncommon to find clumps of *Turbinaria ornata* overgrown by extensive mats of *Hypnea nidulans.* (e.g. at Lopta).

Rhodophyceae

Bangiophycidae

Bangiales

Erythropeltidaceae

Erythrotrichia J.E. Areschoug 1850

Erythrotrichia carnea (Dillwyn) J. Agardh 1883: 15, pl. I, figs 8–10; Weber-van Bosse 1921: 188; Børgesen 1924: 268; Taylor 1928: 133, pl. 20, figs 4, 5; 1942: 76; 1950: 117; 1957: 202, pl. 28, figs 13–15; 1960: 292; Dawson 1953: 10; 1956: 45; 1957: 111, fig. 16*c*; Durairatnam 1961: 47, pl. 11, figs 3, 4; Trono 1969: 42; Womersley and Bailey 1970: 300; Dawes 1974: 117; Tsuda and Wray 1977: 105; Cribb 1983: 10, pl. 1, figs 4–6; Lewis and Norris 1987: 14 (f. *tenuis* Tanaka); Santelices and Abbott 1987: 8; Tsuda 1991: 50; Millar and Kraft 1993: 4; Womersley 1994: 28, fig. 2*A–D*.

Conferva carnea Dillwyn 1805: 54, pl. 84 (type locality: Glamorganshire, Wales).

Bangia ceramicola Sluiter 1908.

Erythrotrichia biseriata Tanaka (*sensu* Yoshida *et al.* 1990 and Tsuda 1991).

(Figs 109, 118)

Plants composed of single terete filaments 75–350 μm long and 15–20 μm in diameter, tapering towards the base and attached via a lobed basal cell. Cells longer than broad 17–25 μm long, with axial chromatophores and a single central pyrenoid. Collections sterile.

Distribution

Tropical regions of the Pacific and Indian Oceans.

Fijian Records

Garbary *et al.* 1991: 254; South 1991: 7; South and Kasahara 1992: 55; Raj 1993: 54, fig. 21.

Rotuman Distribution

Lopta (*L29/ USP S5: 20).

Habitat and Remarks

Epiphytic on *Chnoospora minima*, on the reef crest.

Florideophycidae

Acrochaetiales

Acrochaetiaceae

Audouinella Bory 1823: 340

Considering the confused state of Acrochaetid classification (see South and Tittley 1986), the nomenclature given here follows a monogeneric scheme as advocated by Dixon and Irvine (1977), Garbary (1979) and Woelkerling (1983).

Audouinella polyblasta (Rosenvinge) J. Price, Lawson et John 1986: 24; South and Tittley 1986: 3.

Chantransia polyblasta Rosenvinge 1909 (type locality unknown).

Chantransia hallandica Kylin 1906: 123, fig. 8 (type locality: Hogardsgrund, Halland, Sweden); Rosenvinge 1909: 93, figs 21–23.

Acrochaetium hallandicum (Kylin) Hamel 1927: 20, 82; Silva *et al.* 1987: 19.

Audouinella hallandica (Kylin) Woelkerling 1973: 82, figs 1–4; Schneider 1983: 9.

Acrochaetium sargassi Børgesen 1915: 17, fig. 7–10 (Type locality: St Thomas, Virgin Is; *vide* Woelkerling 1973: 84); Weber-van Bosse 1921: 193; Taylor 1928: 134, pl. 22 figs 1–5; 1960: 306; Womersley and Bailey 1970: 301.

(Fig. 119)

Plants epiphytic, up to 415 μm high, with inconspicuous sporal basal cell giving rise to 1–2 axes. Erect filaments 7–10 μm in diameter, irregularly branched with individual cells cylindrical, generally 2 diameters long, with parietal lobate chromoplast. Monosporangia ovoid, 7–8 μm wide and 9–10 μm long, borne on short side branchlets adaxially disposed over the erect filaments.

Distribution

Tropical oceans.

Fijian Records

New record for Fiji.

Rotuman Distribution

Hapmafau (*HAP41/ USP S4: 7).

Habitat and Remarks

Epiphytic on *Gelidium pusillum* within algal carpets on exposed rock.

Bonnemaisoniales

Galaxauraceae

Actinotrichia Decaisne

Actinotrichia fragilis (Forsskål) Børgesen 1932: 6; Yamada and Tanaka 1938: 69; Dawson 1954: 416, fig. 28*b*; 1956: 46; Durairatnam 1961: 49; Trono 1969: 45; Womersley and Bailey 1970: 302; Jaasund 1976: 65, fig. 131; Tsuda and Wray 1977: 103; Magruder and Hunt 1979: 57; Cribb 1983: 25, pl. 8, fig. 1; Lewis 1984: 5; Tseng *et al.* 1984: 58, pl. 32, fig. 1; Payri and Meinesz 1985*a*: 511; Lewis and Norris 1987: 15; Silva *et al.* 1987: 22; Garrigue and Tsuda 1988: 63; Coppejans and Prud'homme van Reine 1992*a*: 181; Ohba and Enomoto 1992: 30; Verheij and Prud'homme van Reine 1993: 167, pl. 14, fig. 1.

Fucus fragilis Forsskål 1775: 190 (type locality: Mokha, Yemen).

Actinotrichia rigida (Lamouroux) Decaisne 1842: 18; Montagne 1844: 659; Dickie 1874*a*: 196, 244; Okamura 1916(1916–1923): 30, pl. 158, figs 17–19; Weber-van Bosse 1921: 207, pl. 6 figs 1–2; Lewis 1984: 5; Payri and Meinesz 1985*a*: 511.
Galaxaura rigida Lamouroux 1816: 26, pl. 8, fig. 4 (Type locality: 'la mer des Indes').

(Fig. 113)

Plants up to 2 cm high, reddish-brown in colour, forming dichotomously branched thalli; angle of branching 30–40° below, 85–90° at the tips. Segments terete, 380–440 μm in diameter, provided with characteristic closely-spaced, annular pigmented hair-like filaments 3–6 μm thick. Collections sterile.

Distribution

Tropical Indian and Pacific Oceans.

Fijian Records

Chapman 1971: 168; Kasahara 1985: 44; South 1991: 7; South and Kasahara 1992: 56; Bishop Museum, Hawaii (BISH 623702, 623709, 623717, 623723).

Rotuman Distribution

Hapmafau (HAP42/ USP 433).

Habitat and Remarks

Tide pools, middle reef.

Galaxaura Lamouroux 1812

Galaxaura filamentosa Chou in Taylor 1945: 139 (type locality: Sulphur Bay, Clarion Island, Revilla Gigedo, Mexico); Chou 1945: 39, pl. 1, figs 1–6; pl. 6, fig. 1; Dawson 1954: 419, fig. 30*a*; 1956: 46; 1957: 113; Womersley and Bailey 1970: 303; Tsuda and Wray 1977: 106; Magruder and Hunt 1979: 67; Silva *et al.* 1987: 23.

Galaxaura rudis Kjellman 1900 *sensu* Kasahara 1985 and Silva *et al.* 1987; but *G. rudis* included in *Galaxaura rugosa* (Ellis et Solander) Lamouroux according to Huisman and Borowitzka 1990. Papenfuss *et al.* (1982) include *G. rudis* as a taxonomic synonym of *G. lapidescens* (Ellis et Solander) Lamouroux. See remarks below.

Plants 2.5–3 cm high, bushy and hirsute, attached to substratum via a small discoidal holdfast. Branches whitish pink, terete, densely covered with fine dark red extended assimilatory filaments 18–25 μm in diameter and 1–4 mm long. Axial and assimilatory filaments structurally homogenous, with absence of tumid basal cells and with undifferentiated supporting cells. Plants sterile.

Distribution

Mexico, Vietnam, Micronesia, Hawaii; Solomon Islands, Ryukyu Islands, Fiji.

Fijian Records

Kasahara 1985: 47, pl. 7 fig. 4, pl. 15, fig. *D*; Garbary *et al.* 1991: 255; South 1991: 7; South and Kasahara 1992: 56.

Rotuman Distribution

Sumara Point, Fapufa (USP 872, 873).

Habitat and Remarks

Growing attached to rocky substratum, in exposed tidal pool. The Rotuman plants agree well with the description by Chou (1945), particularly concerning the absence of tumid basal cells. Chou (1945: 40) is of the opinion that *G. rudis* is distinct from *G. filamentosa*, in that the former has well developed supporting and tumid basal cells, as described by Kjellman (1900).

Gelidiales

Gelidiellaceae

Gelidiella Feldmann et Hamel 1934

Gelidiella acerosa (Forsskål) Feldmann et Hamel 1934: 533l; Yamada and Tanaka 1938: 71; Dawson 1953: 82; 1954: 422, fig 33*g*; Kylin 1956: 138; Taylor 1960: 351, pl. 46, fig. 5; Durairatnam 1961: 50, pl. 11, fig. 10; Chapman 1963: 74, fig. 69*a, b*; Womersley and Bailey 1970: 304; Trono 1969: 48, pl. 6, fig. 5; 1972*a*: 103; 1973*d*: 15, pl. 7, fig. 26; Dawes 1974:

119; Jaasund 1976: 71, fig. 142; Woelkerling 1976: 128, figs 219–222; Tsuda and Wray 1977: 106; Magruder and Hunt 1979: 69; Cribb 1983: 29, pl. 6, fig. 1; Lewis 1984: 11; Tseng *et al.* 1984: 69, pl. 35, fig. 4; Payri and Meinesz 1985*a*: 512; Santelices and Stewart 1985: 21, fig. 6; Trono 1986: 262, fig. 71; Lewis and Norris 1987: 17; Silva *et al.* 1987: 25; Garrigue and Tsuda 1988: 65; Littler *et al.* 1989: 172; Tsuda 1991: 52; Coppejans and Prud'homme van Reine 1992*a*: 182; Norris 1992: 35, fig. 20; Ohba and Enomoto 1992: 31; Price and Scott 1992: 25, fig. 4*A–E*; South and Yen 1992: 128; Millar and Kraft 1993: 11; Verheij and Prud'homme van Reine 1993: 182; Wynne 1993: 9.

Fucus acerosus Forsskål 1775: 190 (type locality: Mokha, Yemen).

Fucus rigidus Vahl 1802: 46 (type locality: St. Croix, Virgin Island).

Fucus spiniformis Lamouroux 1805: 77, pl. XXXVI figs 3, 4 ('*spinaeformis*') (syntype localities: Malagasy Republic; Mauritius).

Gelidium spiniforme (Lamouroux) Lamouroux 1813: 129; Montagne 1844: 662.

Sphaerococcus rigidus C. Agardh 1822*a*: 285.

Gelidium rigidum (C. Agardh) Greville 1830: vii; Dickie 1876: 243, 244; Okamura 1909 (1909–1912): 33, pl. 59, figs 1–6; Howe 1932: 169.

Gelidiopsis rigida (C. Agardh) Weber-van Bosse 1904*a*: 104; Okamura 1912 (1909–1912): 188 (both '*rigidum*').

Gelidiopsis rigida (Vahl) Weber-van Bosse 1928: 427, fig. 172 (*sensu* Womersley and Bailey 1970).

Echinocaulon acerosum (Forsskål) Børgesen 1932: 5, pl. 1, fig. 3 (*sensu* Womersley and Bailey 1970).

(Figs 110, 120*a, b*)

Thallus up to 5 cm high, greenish-yellow to dull purple, tough and wiry with decumbent basal parts attached by haptera and bearing free elongate, erect or arcuate-recurved secondary branchlets. Branchlets 458–500 μm in diameter, terete to slightly compressed, up to 45 mm long and 1 mm in diameter, bearing terete filiform and determinate branchlets 2–8 mm long mostly secundly (sometimes radially) or bilaterally disposed. Apical cell about 12 μm in diameter, single and distinctly separated. External cortical cells anticlinally elongated; internal cortical cells somewhat rounded, grading into a medulla of elongate cells about 12–18 μm in diameter, sometimes up to 30 μm. Tetrasporic branches irregularly disposed, with 26–30 oblong-cruciate sporangia up to 33 × 65 μm progressively developed from the apex, and irregularly disposed below the cortical cells. Cystocarps not seen.

Distribution

Tropical Indian and Pacific Oceans.

Fijian Records

Chapman 1971: 169; Kasahara 1985: 52; South 1991: 8; South and Kasahara 1992: 57; in Herb Bishop Museum, Hawaii (BISH 530729, 623672, 623708, 623720).

Rotuman Distribution

Hapmafau (HAP40/ USP 421); Lopta (L17/ USP 348, *L43/ USP S4: 19).

Habitat and Remarks

At Lopta, found on the outer reef crest in very exposed conditions associated with *Laurencia venusta* Yamada and *Chondria sedifolia* Harvey, which together form the dominant cover. At Hapmafau, however, the same species (albeit about half as large) is found within *Valonia aegagropila* mats covering exposed beach rock or the back reef in relatively sheltered conditions. Hence, this plant seems to be present in two extremes of exposure at two opposite sites on the island, and has correspondingly different habits.

Gelidium Lamouroux 1813

Gelidium pusillum (Stackhouse) Le Jolis 1863: 139; Feldmann and Hamel 1934: 112, fig. 19; Dawson 1953: 62; 1954: 420, fig. 31*a–c*; 1956: 46; 1957: 113; Taylor 1960: 354, pl. 45, fig. 4; Durairatnam 1961: 50, pl. 13, figs 1–5; Chapman 1963: 72, fig. 67; Tsuda 1964: 9; Segawa 1965: 63, pl. 36, fig. 276; Trono 1969: 47; Womersley and Bailey 1970: 305; Dawes 1974: 120; Jaasund 1976: 71, fig. 144; Tsuda and Wray 1977: 106; Ngan and Price 1979: 10; Lewis 1984: 10; Tseng *et al.* 1984: 68, pl. 37, fig. 1; Lewis and Norris 1987: 17; Santelices and Abbott 1987: 8; Silva *et al.* 1987: 26; Abbott 1989: 228; Littler *et al.* 1989: 170; Hatta and Prud'homme van Reine 1991: 364, figs 8–10; Tsuda 1991: 52; Coppejans and Prud'homme van Reine 1992*a*: 182; Ohba and Enomoto 1992: 30; South and Yen 1992: 128; Millar and Kraft 1993: 11; Verheij and Prud'homme van Reine 1993: 182; Wynne 1993: 9; Womersley 1994: 133, figs 35*E*, 39*E–K*.

Fucus pusillus Stackhouse 1795 (1795–1801): 16, pl. vi (type locality: Sidmouth, Devonshire, England).

Acrocarpus pusillus (Stackhouse) Kützing 1849: 762.

(Figs 111, 112, 196)

Plants dark purple, up to 4 mm high, forming compact tufts attached to the substratum via disc-like haptera. Erect blades distally terete and constricted, proximally compressed to flattened, strap-shaped; pinnate branches occasionally on the same plant. Apical cell single, distinct, and often protruding. Internal rhyzines sparse, mostly intermixed with innermost cortical cells and outermost medullary cells. Collections sterile.

Distribution

Cosmopolitan in warm and temperate waters.

Fijian Records

Chapman 1971: 168; South and Kasahara 1992: 58; Raj 1993: 49, fig. 22.

Rotuman Distribution

Found at most sites. Representative material: 'Ahau (*A3/ USP S4: 18).

Habitat and Remarks

Forms compact tufts on coral rock, back reef.

Nemaliales

Liagoraceae

Liagora Lamouroux 1812

Liagora valida Harvey 1853: 138, pl. 31*A* (type locality: Sand Key, Florida, USA); Okamura 1931: 109; Abbott 1945: 160, figs 12, 13; Taylor 1950: 120, pl. 56, fig. 1; 1960: 327, pl. 43, fig. 2; Chapman 1963: 59, fig. 56*a, b*; Tsuda and Wray 1977: 109; Lewis 1984: 4; Lewis and Norris 1987: 15; Silva *et al.* 1987: 21; Abbott 1989: 229.

(Figs 114, 121)

Plants light-pink, to 8 cm in diameter, flaccid and heavily calcified, forming densely branched, segmented clumps with regularly dichotomous branching. Assimilatory filaments 350–450 μm long, generally 4 times dichotomous 10–11 μm in diameter, irregularly corymbose at the tips. Only female gametophytes with carpogonial branches collected.

Distribution

Fiji, Micronesia, Hawaii, northern Australia, Philippines, Taiwan, Jamaica, tropical Americas.

Fijian Records

New record for Fiji.

Rotuman Distribution

Hoféa; Lopta (L36/ USP 481, *L48/ USP S7: 14).

Habitat and Remarks

Grows within shallow rocky depressions on outer reef. Specimens were examined by Professor Isabella Abbott at the University of Hawaii, who, in the absence of male plants which are required to identify the species, tentatively confirmed them as belonging to *L. valida.*

Cryptonemiales

Peyssonneliaceae

Peyssonnelia Decaisne 1841

***Peyssonnelia* sp.**

(Figs 116, 122, 123)

Plants dark red to pink, with lightly calcified hypothallus; crustose to lamellate with overlapping shelves or lobes forming rosettes up to 15 mm in diameter and up to 530 μm thick, with longitudinal striations on upper surface of thallus. Hypothallus composed of subrectangular cells up to 25 by 18 μm. Perithallus composed of unbranched, erect rows of cells 6–10 μm in diameter. Thalli loosely attached to substratum via unicellular rhizoids. Plants sterile.

Rotuman Distribution

Hapmafau (HAP45/ USP 450), Kelega (K1/ USP 449).

Habitat and Remarks

Found attached to rocks or coral shelves on outer reef in sunny but wave-protected sites. This species most closely resembles *P. rubra* var. *orientalis* Weber-van Bosse 1921: 270, figs 86–89 (Okamura 1931: 112; Taylor 1950: 121; Dawson 1953: 104, pl. 10, figs 8, 9; 1954: 424, fig. 36*c*; 1956: 47; 1957: 114; Denizot 1968: 122; Santelices and Abbott 1987: 8), based on vegetative characters, but a definite identification is not possible owing to a lack of fertile material.

Corallinales

Corallinaceae

Cheilosporum (Decaisne) Zanardini 1844: 187

Cheilosporum spectabile Harvey ex Grunow 1874: 41 (type locality: Tonga); Weber-van Bosse 1904: 106; Børgesen 1935: 51, fig. 23; Womersley and Bailey 1970: 314, pl. 26, fig. 22; Ngan and Price 1979: 10; Yoshida *et al.* 1990: 290.

(Figs 117, 124)

Plants up to 30 mm high, dark pink, bushy and calcified with dichotomous branching. Individual lobes up to 3 mm across and 850 μm wide, with rounded or acute apices. Lobe angle 55–70° (see Johansen 1977: 176, fig. 26 for lobe-angle calculation). Plants sterile.

Distribution

Fiji, Solomon Islands, Australia, Indonesia, Japan, India.

Fijian Records

Grunow 1874; South and Kasahara 1992: 59.

Rotuman Distribution

'Ahau (A2/ USP 452, *A4/ USP S6: 2); Lopta (*L45/ USP S6: 1); Hapmafau (*HAP54/ USP S6: 3).

Habitat and Remarks

Grows hanging from coral ledges on the reef rim, often shaded and exposed to considerable wave action. At very exposed sites (e.g. Lopta) the lobes of the plants are rounded, whereas in relatively calmer locations (Hapmafau) they are noticeably more acute. This observation agrees with Womersley and Bailey's comment (1970: 314) that lobe shape in this species could be a response to the amount of exposure, crowding or other variables.

Hydrolithon Foslie 1909

Hydrolithon farinosum (Lamouroux) Penrose et Chamberlain 1993: 295–303, figs 1–19.

Melobesia farinosa Lamouroux 1816: 315, pl. XII fig. 3 (type locality: Mediterranean Sea *fide* Chamberlain 1983: 343).

Fosliella farinosa (Lamouroux) Howe 1920: 588; Taylor 1950: 132; 1960: 388; Dawson 1954: 425, fig. 37*c*; 1956: 49; 1957: 114; 1960: 30, pl. 21, fig. 1; pl. 22, fig. 1; Chapman 1963: 91, fig. 92; Trono 1969: 51; Womersley and Bailey 1970: 309; Dawes 1974: 123; Gordon *et al.* 1976: 255, figs 1–4; Chamberlain 1977: 344, figs 1–20; Tsuda and Wray 1977: 106; Cribb 1983: 48, pl. 51, figs 1, 2; Lewis 1984: 14 (var. *chalicodictyon*); Tseng *et al.* 1984: 76, pl. 41, fig. 4; Payri and Meinesz 1985*a*: 512; Silva *et al.* 1987: 34; Garrigue and Tsuda 1988: 64; Tsuda 1991: 51; Millar and Kraft 1993: 13.

(Fig. 140)

Thallus thin and epiphytic, pink-mauve in colour; monostromatic with lobed or rounded margins. Cells quadrangular, up to 20 μm long and 12 μm wide, arranged in more or less radiating rows with the cells of adjacent rows sometimes anastomosing. Plants sterile.

Distribution

Cosmopolitan.

Fijian Records

Grunow 1874; Chapman 1971: 169; South and Kasahara 1992: 59 (all as *Fosliella farinosa* (Lamouroux) Howe).

Rotuman Distribution

Hoféa (*H227/ USP S6: 12).

Habitat and Remarks

Epiphytic on *Chondria dasyphylla*, middle reef tidal pool. The genus *Fosliella* has been transferred to the genus *Hydrolithon* Foslie 1909 by Penrose and Chamberlain (1993), based on characteristics of the tetrasporangial conceptacles.

Jania Lamouroux 1812: 186

Key to the Rotuman Species of *Jania*

1. Thallus not tufted or cushion-like, repent, to 10 mm high; angle of branching more than 45° ..... *J. adhaerens*
1: Thallus tufted and erect, forming dense cushions to 20 mm high; angle of branching 25–30° ..... *J. rubens*

Jania adhaerens Lamouroux 1816: 270 (type locality: 'Méditerranée?'); Taylor 1960: 413, pl. 49, figs 1, 2 (*'adherens'*); Chapman 1963: 86, fig. 85; Tsuda 1964: 10; Dawes 1974: 124; Jaasund 1976: 77, fig. 154; Woelkerling 1976: 132, figs 257–259; Tsuda and Wray 1977: 108; Ngan and Price 1979: 10; Cribb 1983: 47, pl. 10, figs 4, 5; Lewis 1984: 14; Tseng *et al.* 1984: 90, pl. 48, fig. 2; Payri and Meinesz 1985*a*: 513; Lewis and Norris 1987: 18; Silva *et al.* 1987: 34; Littler *et al.* 1989: 204; Tsuda 1991: 54; Price and Scott 1992: 48, fig. 12*A–C*; South and Yen 1992: 129.

(Fig. 126)

Plants erect to repent, up to 10 mm high, branching at angles of more than 45°. Branches 190–200 μm in diameter, the segments 3–5 diameters long with articulations at the base of each branch and often between forkings. Apex of branches conical, roundish to acute. Plants sterile.

Distribution

Fiji, Nauru, Micronesia, Tahiti; Australia, Taiwan, Philippines, Japan, China, Caribbean, Tanzania.

Fijian Records

Garbary *et al.* 1991: 255; South and Kasahara 1992: 60.

Rotuman Distribution

Kelega (K2/ USP 559); Lopta (*L49/ USP S7: 15); common at most sites around the island.

Habitat and Remarks

Epiphytic on larger algae or corals, or attached to rocks in tide pools and back reef sites.

Jania rubens (Linnaeus) Lamouroux 1816: 272, pl. 9, figs 6, 7; Setchell 1935: 228; Taylor 1950: 133; 1960: 413, pl. 49, fig. 3; Chapman 1955: 356; 1963: 85, fig. 84; Womersley and Bailey 1970: 314; Haritonidis and Tsekos 1976: 281; Tsuda and Wray 1977: 108; Lewis 1984: 15; Payri and Meinesz 1985*a*: 513; Silva *et al.* 1987: 35; Littler *et al.* 1989: 206; Yoshida *et al.* 1990: 291; Millar and Kraft 1993: 14.

Corallina rubens Linnaeus 1758: 806 (type locality: Europe).

(Figs 125*a–c*, 141)

Plants pink-red, tufted and erect, forming extended, tightly packed cushions up to 20 mm high. Branching dichotomous, the angle narrow (less than 45°, typically about 25–30°)

resulting in the forks appearing nearly parallel to each other. Branches 115–170 μm in diameter, composed of segments 320–410 μm long held together by flexible joints. Tetrasporangial conceptacles terminal and vasiform; spermatangial conceptacles terminal, lanceolate to fusiform. Cystocarps not seen.

Distribution

Fiji, Bikini Atoll, Tuvalu, Tahiti, Solomon Islands, Micronesia, Lord Howe Island, northern Australia, Philippines, Japan, Caribbean, Greece.

Fijian Records

New published record; in Herb Bishop Museum, Hawaii (BISH 535460, 535461).

Rotuman Distribution

Lopta (L41/ USP 560).

Habitat and Remarks

Grows as tightly-packed clumps attached to rocks or coral debris, on the outer reef and in tide pools.

Lithophyllum Philippi 1837: 389

Lithophyllum tamiense Heydrich 1897: 1, figs 4–7 (type locality: Tami Island, Papua New Guinea).Verheij 1993: 43, figs 19–26; Verheij and Prud'homme van Reine 1993: 179.

Lithophyllum tamiense Heydrich 1897: 1; 1901: 419; Foslie 1900*a*: 16; 1901*c*: 17; Woelkerling and Campbell 1992.

Lithothamnion moluccense Foslie 1897: 12.

Lithophyllum moluccense (Foslie) Foslie 1901*a*: 12; 1901*b*: 17; 1904: 65–69; Gordon *et al.* 1976: 270–272.

Goniolithon moluccense (Foslie) Foslie 1898: 8; 1900*b*: 10, 11; 1901*b*: 17.

Lithothamnion pygmaeum Heydrich 1897: 3.

Goniolithon pygmaeum (Heydrich) Foslie 1898: 8.

Lithophyllum torquescens Foslie 1901*a*: 11; 1901*c*: 23, 24.

Lithophyllum moluccense f. *torquescens* Foslie 1904: 69, 70.

(Fig. 115)

Plants to 5 cm high; crustose base bearing cylindrical branches up to 8 mm long and 2 mm in diameter, with rounded ends. Thallus pseudoparenchymatous; cells of adjacent filaments connected by secondary pit connections. Filaments terminated by a single, larger, rounded epithallial cell 9–10 μm in diameter and 3–5 μm long, and 1 subepithallial meristematic cell producing new epithallial cells outwardly or additional vegetative cells inwardly. Tetrasporangial conceptacles 300–325 μm in diameter and 120–130 μm in height; conceptacle floor 7–8-cells below thallus surface with conceptacle roof 3–4 cells thick. Columella well developed, with conceptacle raised about 50% from thallus surface. Old and empty conceptacles buried.

Distribution

Tropical Indo-Pacific, West Indies.

Fijian Records

New record for Fiji.

Rotuman Distribution

Common at most sites. Representative material: Kelega (K2/ USP 616).

Habitat and Remarks

On the exposed outer reef, where it occurs as more or less eroded concretions attached to the coral rubble.

Gigartinales

Gracilariaceae

Gracilaria Greville 1830: 121

Gracilaria* sp. aff. *G. textorii (Suringar) De Toni 1895: 27; Xia and Yamamoto 1985: 69, figs 24–31; Millar and Kraft 1993: 28.

Thallus foliose, consisting of irregularly dichotomous blades with rounded apices and smooth margins. Medullary cells ovate to ovoid, 80–125 μm in diameter; cortex distromatic, the outermost layer of pyriform to spherical cells 8–12 μm in diameter, the inner layer of ovate to spherical cells 30–50 μm in diameter. Plants sterile.

Rotuman Distribution

Maka Bay (MAK20/ USP 614).

Habitat and Remarks

Growing abundantly within the seagrass beds in Maka Bay, in association with *Sargassum polycystum* and *Enteromorpha flexuosa.* Owing to a lack of fertile material, this species of *Gracilaria* cannot be definitively identified. However, from its habit and internal structure it most closely resembles *G. textorii* (Suringar) De Toni.

Hypneaceae

Hypnea Lamouroux 1813: 131

Hypnea nidulans Setchell 1924: 161, fig. 30 (type locality: Tutuila Island, American Samoa); Weber-van Bosse 1928: 454, fig. 192; Okamura 1931: 114; Tanaka 1941: 246, figs 18, 19; Dawson 1954: 438, fig. 46*e–g*; 1957: 115; Tsuda 1964: 9; Jaasund 1976: 97, fig. 197; Tsuda and Wray 1977: 108; Lewis 1984: 35; Payri and Meinesz 1985*a*: 512; Lewis and Norris 1987: 20; Silva *et al.* 1987: 50.

Hypnea nidulans is included within *H. pannosa* J. Agardh (1847: 14) by the following authors: Womersley and Bailey (1970: 319); Kasahara (1985: 62); Tsuda (1991: 54); Price and Scott (1992: 38), but both species are recognised by Silva *et al.* (1987: 50).

(Fig. 136)

Thallus purple-pink, up to 2 cm high, with mostly terete axes up to 1 mm broad. Branching irregular, with arcuate tendency for the axis and branches. Branches not constricted at the base, terminating in sharply acute apices. Medulla up to 740 μm in diameter, consisting of a central axial cell giving way radially to medullary cells up to 200 μm in diameter. Lenticular thickenings present in some medullary cells. Inner cortical cells 23–30 μm in diameter; pigmented epidermal cells 8–9 μm in diameter. Apical cell single, prominent, up to 10 μm in diameter.

Distribution

Tropical oceans.

Fijian Records

New record for Fiji (but see note above).

Rotuman Distribution

Lopta (L21/ USP 349).

Habitat and Remarks

Growing as extensive mats on the outer reef crest in very exposed locations (e.g. Lopta reef). Often the dominant cover, it is not uncommon to find this species competing for space with (and sometimes overgrowing) other reef-crest algae such as *Turbinaria ornata* (one small *Turbinaria* plant was totally engulfed by the *Hypnea* thallus). The Rotuman plants closely resemble *H. nidulans* Setchell as described by Tanaka (1941: 246).

Solieriaceae

Meristotheca J. Agardh 1872

Meristotheca procumbens P. Gabrielson et Kraft 1984: 241, fig. 14*A–D* (type locality: Lord Howe Island, Australia); Millar and Kraft 1993: 26; N'Yeurt 1995: 243, figs 3–10.

(Figs 137, 142–147, 203–205)

Plants deep pink and turgid when fresh, procumbent, up to 10 cm in diameter, irregularly branched and lobed. Thalli attached at various points to supporting coral via terete haptera up to 2 mm long. Fronds up to 800 μm in thickness, composed of an inner medulla of predominantly rhizoidal filaments (40% of thallus) surrounded on both sides by equal thicknesses of a cortex grading from large unpigmented stellate-ovate cells up to 95 μm in diameter to a surface layer of small pigmented rectangular cortical cells up to 10 × 20 μm. Cystocarps and tetrasporangia absent from Rotuman specimens collected by the author in May, June and December, January, although described by Gabrielson and Kraft (1984: 245) from Lord Howe specimens.

Distribution

Fiji, Lord Howe Island, New South Wales, Australia.

Fijian Records

New published record for Fiji. In Herb. Bishop Museum, Hawaii (BISH 536995; 537010).

Rotuman Distribution

Fapufa (F3/ USP 411); Hapmafau; Losa; Savlei; Tua'koi (T6/ USP 351). Common on the north-west and south coasts.

Habitat and Remarks

Growing at the base of *Acropora* coral debris in shallow lagoonal waters or tide pools. This alga is edible, being commonly collected by Rotumans to be made into a kind of gel pudding (*'Lum mie'ta'*) (N'Yeurt 1995). The fresh alga is soaked in seawater, cleaned of coral debris, and boiled in coconut cream, then garnished with onions and fish. (Fig. 205).

Specimens of this genus (identified as *Meristotheca* sp.) were located by the author in the collections of the Bernice P. Bishop Museum Herbarium in Hawaii, having been collected in October 1975 and August 1977 from Rotuma and identified by W.E. Booth. These

specimens were loaned to the present author, and were found to be very similar to those collected for this study.

Rhodymeniales

Champiaceae

Champia Desvaux 1809: 245

Champia parvula (C. Agardh) Harvey 1853: 76; Okamura 1931: 112; Lucas 1935: 221; Yamada and Tanaka 1938: 76; Dawson 1954: 443, fig. 52*c*; 1956: 51; 1957: 116; Taylor 1960: 490, pl. 61, fig. 4; Durairatnam 1961: 65; Chapman 1963: 120, fig. 125; Segawa 1965: 100, fig. 467; Womersley and Bailey 1970: 321; Dawes 1974: 139, fig. 65; Jaasund 1976: 99, fig. 203; Tsuda and Wray 1977: 105; Ngan and Price 1979: 14; Cribb 1983: 70, pl. 21 fig. 1; Lewis 1984: 38; Tseng *et al.* 1984: 122, pl. 64, fig. 2; Payri and Meinesz 1985*a*: 511; Heijs 1987: 147; Lewis and Norris 1987: 21; Silva *et al.* 1987: 53; Garrigue and Tsuda 1988: 64; Abbott 1989: 229; Littler *et al.* 1989: 142; Millar 1990: 371; Tsuda 1991: 49; Ohba and Enomoto 1992: 31; Price and Scott 1992: 55, fig. 14*A–E*; Millar and Kraft 1993: 29; Verheij and Prud'homme van Reine 1993: 195.

Chondria parvula C. Agardh 1824: 207 (type locality: Cádiz, Spain).

(Fig. 160)

Thallus greyish-red to brownish, composed of turgid anastomosing branches up to 0.5 mm in diameter. Branches terete, tapering and regularly constricted into cask-shaped segments; branch apex obtuse. Cortical layer composed of 2 distinct types of cells, 1 type ellipsoidal, 20–40 μm in diameter and 50–60 μm long, the other smaller and isodiameteric 10–12 μm in diameter. Unicellular hairs up to 100 μm long and 6 μm in diameter are often present on the thallus, projecting at right angle from certain cortical cells. Plants sterile.

Distribution

Tropical and warm oceans in general.

Fijian Records

Kapraun and Bowden 1978: 201, fig. 28; South and Kasahara 1992: 62; in Herb Bishop Museum, Hawaii (BISH 528448).

Rotuman Distribution

Maka Bay (*MAK14/ USP S4: 16).

Habitat and Remarks

Epiphytic on *Gracilaria* sp. aff. *G. textorii*, back reef.

Rhodymeniaceae

Gelidiopsis Schmitz 1895

Gelidiopsis intricata (C. Agardh) Vickers 1905: 61; Weber-van Bosse 1928: 425; Yamada and Tanaka 1938: 74, figs 6*a–c*; Dawson 1954: 423, fig. 34*a–d*; 1956: 46; 1957: 113; Taylor 1960: 353; Tsuda 1964: 9; Trono 1969: 49; Womersley and Bailey 1970: 318; Jaasund 1976: 87, fig. 177; Tsuda 1976*b*: 329; Tsuda and Wray 1977: 106; Cribb 1983: 56, pl. 13, figs 1, 2; Lewis 1984: 24; Tseng *et al.* 1984: 100, pl. 53, fig. 4; Payri and Meinesz 1985*a*: 512; Silva *et al.* 1987: 40; Garrigue and Tsuda 1988: 65; Abbott 1989: 229; Yoshida *et al.* 1990: 295; Tsuda 1991: 52; Ohba and Enomoto 1992: 31; Price and Scott 1992: 51, fig. 13*A–F*; South and Yen 1992: 129; Millar and Kraft 1993: 32; Wynne 1993: 12.

Sphaerococcus intricatus C. Agardh 1822*a*: 333 (syntype localities: Mauritius; Hawaiian Island; 'Ravak' (Lawak); Waigeo Island; Moluccas; Indonesia).

(Fig. 192)

Thallus gregarious, up to 40 mm high and 150–350 μm in diameter; dark-reddish in colour with entangled, setaceous lower branches; upper parts dichotomously branched, flattened at dichotomies, with no distinct apical cell. Thallus cross-section composed of a medulla of small cells 7–10 μm in diameter, surrounded by a layer of elongated cortical cells 2–5 μm in diameter; loosely packed and ovoid in surface view. Sporangia borne terminally from branchlets, up to 970 μm high and 530–660 μm broad, spatulate and containing cruciate tetraspores 23–24 μm in diameter.

Distribution

Fiji, Micronesia, Tahiti, New Caledonia, Hawaii, Nauru, Pitcairn Island, Solomon Islands, northern Australia, Papua New Guinea, Indonesia, Philippines, Maldives, China, Tanzania.

Fijian Records

Kasahara 1985: 60, pl. 9, fig. 4; South and Kasahara 1992: 61.

Rotuman Distribution

Fapufa (F7/ USP 561); Jölmea (J2/ USP 564, *J7/ USP S7: 16); Losa (LS1/ USP 562).

Habitat and Remarks

Forming clumps in tide pools and beneath rocky ledges. Norris (1987) transfered the genus *Gelidiopsis* to *Ceratodictyon* Schmitz (1889: 443) based on culture results, but the separate status of these entities is maintained by Price and Kraft (1991), who emphasise distinct differences in reproductive anatomy and habit between the two genera.

Coelarthrum Børgesen 1910

Coelarthrum boergesenii Weber-van Bosse 1928: 473, figs 207, 208 (syntype localities: Borneo; Saleyer Island; Paternoster Island, Indian Ocean); Børgesen 1944: 18, fig. 12; Tsuda and Wray 1977: 105; Cribb 1983: 68, pl. 20, figs 1–4; Lewis 1984: 37; Abbott 1989: 229; Tsuda 1991: 50.

Coelarthrum coactum Okamura and Segawa in Segawa 1936.

(Fig. 138*a*, *b*)

Plants deep red, erect, up to 35 mm high, composed of hollow, globular dichotomous vesicles 2–5 mm high, narrow at the base and rounded at the top. Lateral ramifications and anastomosing of the vesicles common. Wall of vesicles 2-layered, the outer layer continuous and composed of obovoid cells 3–4 μm in diameter; the inner layer of much larger, closely-spaced ovoidal cells 28–42 μm wide. Cystocarps spread over vesicle surface. Gland cells not seen.

Distribution

Fiji, southern Marshall Islands, northern Australia, Hawaii, Ryukyu Islands, Indian Ocean.

Fijian Record

New record for Fiji.

Rotuman Distribution

Ropure (Hapmak) (R1/ USP 441).

Habitat and Remarks

Found under overhanging coral at depths of 1–2 m towards the passage on the outer reef, associated with *Hypnea nidulans* and *Dictyopteris repens*. A number of small red algae (*Griffithsia subcylindrica*, *Herposiphonia* sp.) were epiphytic. The Rotuma specimens were more than 15 mm high and hence larger than the f. *minima* described by Weber-van Bosse (1928: 474) and reported in the Pacific region (Dawson 1956: 51, fig. 47; Womersley and Bailey 1970: 320).

Coelothrix Børgesen 1920: 389

Coelothrix irregularis (Harvey) Børgesen 1920: 389; Dawson 1957: 115, fig. 23*b*; Taylor 1960: 488, pl. 45, fig. 3; pl. 46, fig. 4; Chapman 1963: 117, fig. 121; Trono 1969: 66, pl. 6, fig. 6; pl. 7, fig. 5; Jaasund 1976: 101, fig. 208; Tsuda and Wray 1977: 105; Magruder and Hunt 1979: 63; Cribb 1983: 68; Lewis 1984: 37; Payri and Meinesz 1985*a*: 511; Silva *et al.* 1987: 52; Littler *et al.* 1989: 170; Tsuda 1991: 50; Price and Scott 1992: 60, fig. 17*A–D*; Millar and Kraft 1993: 31.

Cordylecladia? irregularis Harvey 1853: 156 (type locality: Key West, Florida, USA).

(Fig. 195*a–b*)

Thallus up to 4 cm long and 600 μm in diameter, firm and pliable; axes arcuate and creeping, bearing erect, terete branches 250–450 μm in diameter. Branch apices obtuse. Thallus multiaxial, hollow, with slender central cavity up to 200 μm in diameter surrounded by a compact layer of tissue 5–6 cells thick. Cortical cells cylindrical, 40–60 μm in diameter and up to 80 μm long; innermost cells slender, consisting of longitudinal axial filaments up to 35 μm in diameter, often bearing subspherical gland cells 45–60 μm in diameter. Surface cells of 2 distinct types, some longitudinally elongate, elliptical, 40–100 μm long and up to 30 μm wide others isodiameteric, up to 25 μm in diameter. Plants sterile.

Distribution

Fiji, Micronesia, Tahiti, Hawaii, Australia, Philippines, Japan, tropical Americas, Caribbean, West Indies, Tanzania.

Fijian Record

New record for Fiji.

Rotuman Distribution

Maka Bay (MAK18/ USP 613).

Habitat and Remarks

Growing intertwined with *Laurencia* sp. within seagrass beds, at 0.5–1 m depths.

Rhodymenia Greville 1830: 48

Rhodymenia divaricata Dawson 1941: 141, pl. 23 fig. 31 (type locality: Guaymas Bay, Gonora, Mexico); Dawson 1963*a*: 460, pl. 89(13) fig. 2; Trono 1969: 65, pl. 8 fig. 6; Tsuda and Wray 1977: 111.

(Figs 139, 161)

Thallus violet-purple, 3–4 cm high, estipitate and expanding basally into an irregularly, divaricately dichotomous, complanate blade 270–280 μm thick and 3–8 mm broad, with

branching at intervals of 3–12 mm. Ultimate segments broadly rounded, lobed, consisting of a medulla 220–225 μm thick composed of 4 or 5 layers of cells up to 115 μm in diameter grading into a cortex of 1 or 2 layers of pigmented angular cells c. 5 × 13 μm. Outer medullary cells of lower portions of thallus filled with floridean starch grains 47–60 μm in diameter. Tetraspores 25–32 μm in diameter, scattered below the cortex within the outer medulla.

Distribution

Fiji, Caroline Islands, Mexico.

Fijian Record

New record for Fiji.

Rotuman Distribution

Maka Bay (MAK7/ USP 352, MAK8/ USP 353).

Habitat and Remarks

Growing beneath tabular *pavona* coral on the outer-middle reef where it forms clumps up to 15 cm in diameter.

Ceramiales

Ceramiaceae

Centroceras Kützing 1841: 731

Key to the Rotuman Species of *Centroceras*

1. Apices apiculate ..... *C. apiculatum*
1: Apices incurved-forcipate ..... *C. clavulatum*

Centroceras apiculatum Yamada 1944: 42; Dawson 1956: 55, fig. 55; Cribb 1983: 75, pl. 26, fig. 1, pl. 57, figs 1, 2; Price and Scott 1992: 79, fig. 24*A–D*; Wynne 1993: 12, fig. 6.

(Figs 148–151, 163)

Thalli up to 2.5 mm high and 117–140 μm in diameter, epiphytic via translucent rhizoids 23–30 μm in diameter projecting from ventral surface of prostrate axes. Branching mostly simple, with apices apiculate, non-forcipate, terminating in a large apical cell 10–11 μm long which undergoes transverse division and from the basal part of which gradually flat, disc-shaped segments are cut off. Axial cells ovoid, 50–54 μm in diameter. Thalli fully corticated; corticating in distinct pattern of horizontally-disposed subrectangular pericentral cells 7–15 μm in diameter at nodal points, and vertically-disposed, elongated ovoid cells 14–20 μm between nodes. Internodal distances (between pit-connections of axial cells) 45–48 μm. Tetrasporangia cruciate, 30–35 μm in diameter, arranged in pairs in stichidia-like clavate branchlets up to 42 μm long and 20 μm broad.

Distribution

Fiji, Micronesia, northern Australia, Maldives.

Fijian Records

Garbary *et al.* 1991: 254; South *et al.* 1993: 188.

Rotuman Distribution

Hapmafau (*HAP57/ USP S4: 10, *HAP58/ USP S4: 11, *HAP59/ USP S4: 12).

Habitat and Remarks

Epiphytic on *Valonia aegagropila* within algal carpet on exposed beach rock platforms.

Centroceras clavulatum (C. Agardh) Montagne 1846: 140; Okamura 1931: 115; Børgesen 1935: 57; Yamada and Tanaka 1938: 82; Taylor 1950: 139; 1960: 537; Dawson 1954: 446, fig. 54*b*; Chapman 1955: 356; Dawson 1956: 55; 1957: 122; Moul 1957: 46; Durairatnam 1961: 66; Chapman 1963: 173, fig. 180; Segawa 1965: 106, fig. 504; Trono 1969: 73; Womersley and Bailey 1970: 323; Dawes 1974: 143, fig. 68; Haritonidis and Tsekos 1976: 280; Jaasund 1976: 109, fig. 222; Tsuda 1976*b*: 329; Woelkerling 1976: 120, figs 153–157; Tsuda and Wray 1977: 104; Magruder and Hunt 1979: 61; Ngan and Price 1979: 14; Cribb 1983: 75, pl. 25, figs 2, 3; pl. 57, figs 1, 2; Lewis 1984: 40; Tseng *et al.* 1984: 126, pl. 66, fig. 2; Payri and Meinesz 1985*a*: 511; Lewis and Norris 1987: 21; Santelices and Abbott 1987: 9; Silva *et al.* 1987: 54; Garrigue and Tsuda 1988: 64; Abbott 1989: 229; Littler *et al.* 1989: 144; Millar 1990: 390, figs 40*E–G*; Tsuda 1991: 49; Coppejans and Prud'homme van Reine 1992*a*: 188; Price and Scott 1992: 81, figs 25*A–E*; Millar and Kraft 1993: 37.

Ceramium clavulatum C. Agardh 1822*b*: 2 (type locality: Callao, Peru).

Centroceras cryptacanthum Kützing 1841: 741 (type locality: Antilles).

Centroceras clavulatum (C. Agardh) Montagne var. *cryptacanthum* (Kützing) Grunow 1867: 65.

Centroceras hyalacanthum Kützing 1841: 742 (type locality: 'Wahrscheinlich aus Westindien'), *fide* J. Agardh 1851 (1851–1863): 148–149.

(Fig. 199)

Thallus dark brownish-maroon 120–128 μm in diameter; branching dichotomous with incurved forcipate apices. Thallus segmented; nodes with verticillate spines 1 or 2 cells long imparting characteristic light and dark banding pattern to axis. Internodes 135–150 μm long in mid-thallus. No tetraspores observed on Rotuman specimens.

Distribution

Tropical and warm oceans.

Fijian Records

Grunow 1874 ('var. *hyalcanthum* Kützing'); Chapman 1971: 170; South and Kasahara 1992: 63.

Rotuman Distribution

Lopta (*L52/ USP S7: 12).

Habitat and Remarks

Occurs within *Jania rubens* clumps in association with various species of *Ceramium*.

Ceramium Roth 1797: 146

Key to the Rotuman Species of *Ceramium*

1. Branching dichotomous 3
1: Branching monopodial 2
2. Plants to 0.6 mm high, cortication sparse with slender axial cells, not smooth at the edges ..... *C. codii*
2: Plants to 1.3 mm high, cortication moderate with ovoid to globose axial cells, smooth at the edges ..... *C. vagans*

3. Plants to 5 mm high; apices forcipate with sparse dichotomous branching; cortical band smooth at the edges, not curving upwards ..... *C. zacae*
3: Plants to 10 mm high; apices strongly circinate with dense and repeatedly dichotomous branching, cortical band bulging outwards at the edges and curving upwards ..... *C. mazatlanense*

Ceramium codii (Richards) Mazoyer 1938: 324; Taylor 1960: 526; Jaasund 1970*b*: 68, fig. 1*F, N*; Dawes 1974: 145; Jaasund 1976: 107, fig. 216; Cribb 1983: 80, pl. 27, figs 1–4; Lewis 1984: 41; Millar 1990: 393, figs 41*D–F*; 43*B*; Yoshida *et al.* 1990: 300; Price and Scott 1992: 86, fig. 26*A–D*; Millar and Kraft 1993: 38.

Ceramothamnion codii Richards 1901: 264, pls 21, 22 (type locality: Bermuda).

Ceramothamnion adriaticum Schiller 1911: 90.

Ceramium serpens sensu Dawson 1962*b*: 64, pl. 25, fig. 6 (*vide* Millar 1990: 393).

(Figs 155*a, b*, 166)

Plants epiphytic, bright red-maroon, up to 600 μm high and 29–47 μm in diameter. Branching straight, with rarely bifurcate tips and narrow cortical band. Axial cells elongate and slender, cylindrical, 51–54 μm long. Nodal cortical band 10–13 μm long, composed of one ring of larger, transversely elongate periaxial cells and 1 or 2 rings of irregularly arranged smaller cells. Acropetal and basipetal cortical cells single-layered, triangular to polygonal in surface view.

Distribution

Fiji, Australia, Japan, Caribbean, tropical Americas, Tanzania.

Fijian Record

New record for Fiji.

Rotuman Distribution

Hoféa (*H226/ USP S4: 14).

Habitat and Remarks

Epiphytic on *Heterosiphonia subsecundata*, the latter epiphytic on *Melanamansia glomerata* within tidal pools in middle reef.

Ceramium mazatlanense Dawson 1950: 130, pl. 2, figs 14, 15 (type locality: Mazatlan, Sinaloa, Mexico); Dawson 1954: 448, fig. 55*g–j*; 1956: 53; 1957: 122; 1962: 59, pl. 23, figs 1, 2; Womersley and Bailey 1970: 324; Jaasund 1970*b*: 67, fig. 1*A*; 1976: 107, fig. 215; Tsuda and Wray 1977: 104; Ngan and Price 1979: 14; Lewis 1984: 42; Silva *et al.* 1987: 55; Abbott 1989: 230; Tsuda 1991: 49; South and Yen 1992: 129.

(Figs 156, 157, 165)

Thalli up to 10 mm high and 190 μm in diameter, arising from a creeping axis 200–250 μm in diameter attached to the substratum via hyaline rhizoids projecting from ventral nodal surfaces. Branching dense and repeatedly dichotomous, with strongly circinate apices. Cortication extensive, with narrow internodes 32–37 μm in middle of erect branches, becoming noticeably shorter (6–11 μm) towards the apex. Cortical bands 50–55 μm broad, bulging outward at the edges and curving upwards. Axial cells subglobular, 72–77 μm in diameter, from which arise a row of 6–8 periaxial cells giving rise to 2–3 rows of acropetally directed apical cells 5–10 μm in diameter, and a few basipetally directed irregularly disposed and angular axial cells 10–12 μm in diameter. Cystocarps 200–240 μm in diameter, borne at dichotomies on branch apices. Carposporangia 25–35 μm in diameter.

Distribution

Fiji, Micronesia, Solomon Islands, Nauru, Hawaii, Australia, Philippines, Mexico, Tanzania.

Fijian Records

Garbary *et al.* 1991: 254 (as *C. mazatlanse*); South *et al.* 1993: 188.

Rotuman Distribution

Lopta (*L44/ USP S5: 1, *L56/ USP S7: 10).

Habitat and Remarks

Found within *Jania rubens* clumps, middle reef.

Ceramium vagans P.C. Silva in Silva *et al.* 1987: 56.

Ceramium vagabundum Dawson 1957: 121, fig. 27*e* (as *C. vagabunde*) (type locality: Parry Island, Eniwetok Atoll, Marshall Island) (replaced name); Dawson 1954: 450, fig. 56*b* (as *Ceramium* sp.); 1962: 66, pl. 27 fig. 5; Tsuda and Wray 1977: 104; Lewis 1984: 43 (as *C. vagabunde*); Millar and Kraft 1993: 39 (as *C. vagabunde*).

(Figs 154, 158, 159, 162)

Thallus creeping, with erect monopodial branches 0.5–1.3 mm high and 133–180 μm in diameter, attached to the substratum via small hyaline rhizoids up to 250 μm long and 35 μm wide projecting from ventral nodal surfaces. Branch apices not circinate or forcipate, blunt to slightly fusiform. Axial cells globose to ovoid, 50–62 μm in diameter, giving rise to a row of 6–8 periaxial cells 15–20 μm in diameter from which arise 2–5 rows of progressively smaller, irregularly disposed acropetally directed apical cells and 1 or 2 rows of larger, basapetally directed angular apical cells 7–12 μm in diameter. Cortical band smooth at the edges, 45–50 μm wide with internodal spaces 72–75 μm long in middle of erect branches. Plants sterile.

Distribution

Fiji, Micronesia, Australia, Philippines, Vietnam, Mexico.

Fijian Records

Kapraun and Bowden 1978: 201; South and Kasahara 1992: 63 (both as *C. vagabunde* Dawson).

Rotuman Distribution

Lopta (*L42/ USP S5: 2, S7: 10).

Habitat and Remarks

Found with other *Ceramium* species within *Jania rubens* clump, middle reef.

Ceramium zacae Setchell et Gardner 1937: 89, pl. 8 figs 22*a–c* (type locality: Bahía San Bartolomé (Bahía Tortugas), Baja California Sur, Mexico); Dawson 1950: 134, pl. 2, figs 27–28; 1957: 8; 1962: 67, pl. 26, figs 4–6; Fortes and Trono 1979: 60, fig. 11; Silva *et al.* 1987: 56.

(Figs 152, 153, 164)

Thallus epiphytic, up to 5 mm high and 90–100 μm in diameter, arising from prostrate filaments adhering by rhizoids from ventral nodal surfaces. Branching dichotomous, with

forcipate apices. Cortical band 57–60 μm in diameter and 4–5 rows wide, smooth at the margins and somewhat elongated and irregular acropetally; truncate basipetally. Axial cells ovoid; internodal areas 97–100 μm long. Periaxial cells 6–8, giving rise acropetally to 2 rows of progressively smaller derivatives and basipetally to 1–2 rows of triangular to subrectangular derivatives. Plants sterile.

Distribution

Fiji, Philippines, Mexico.

Fijian Records

New record for Fiji.

Rotuman Distribution

Hapmafau (*HAP50/ USP S4: 8).

Habitat and Remarks

Epiphytic on *Valonia aegagropila* on exposed rock platforms, back reef.

Griffithsia C. Agardh 1817: 28

Griffithsia subcylindrica Okamura 1930(1929–1932): 99, pl. 8; Cribb 1983: 92, pl. 24, fig. 1; Lewis 1984: 43; Tseng *et al.* 1984: 130, pl. 68, fig. 3; Millar 1990: 411, fig. 50*E, F*; Price and Scott 1992: 125, fig. 42*A, B*; Millar and Kraft 1993: 40.

(Fig. 168)

Thallus light purple to red, up to 10 mm long; moniliform 160–300 μm in diameter, branching irregularly lateral. Cells ellipsoidal to subcylindrical, about 70 × 170 μm in middle of thallus. Basal rhizoidal filaments up to 50 μm in diameter, spaced at 50–170 μm intervals. Apical cells about 18 × 125 μm. Plants sterile.

Distribution

Fiji, Australia, China, Japan.

Fijian Record

New record for Fiji.

Rotuman Distribution

Hapmafau; *Ropure* (*R3/ USP S5: 17).

Habitat and Remarks

Sandy tidal pools, in back reef locations.

Wrangelia C. Agardh 1828: 136

Wrangelia argus (Montagne) Montagne 1856: 444; Børgesen 1916: 116, figs 125, 126; Okamura 1935(1933–1942): 46, pl. 324; Dawson 1954: 444, fig. 54*g*; 1956: 56; 1957: 119; Taylor 1960: 502, pl. 66, figs 7, 8; Chapman 1963: 164, fig. 170*a–e*; Womersley and Bailey 1970: 325; Tsuda and Wray 1977: 112; Cribb 1983: 94, pl. 66, fig. 1; Lewis 1984: 45; Tseng *et al.* 1984: 132, pl. 69, fig. 4; Silva *et al.* 1987: 57; Garrigue and Tsuda 1988: 67; Coppejans and Prud'homme van Reine 1992*a*: 188; Price and Scott 1992: 134, fig. 46*A–E*; Millar and Kraft 1993: 43.

Griffithsia argus Montagne 1841 (1839–1842): 176, pl. 8, fig. 4 (type locality: Roque del Gando, Islas Canarias).

Wrangelia tayloriana Tseng (*sensu* Tsuda 1991: 57).

(Figs 167, 169–172)

Plants in turf-like colonies, purple red with a slight iridescence; 5–7 mm high and 1.5–1.8 mm broad, plumosely branched in 2 indistinct ranks. Main axis 41–58 μm in diameter, uncorticated with determinate lateral branchlets 17–24 μm in diameter terminating in attenuate cells. Tetrasporangia 55–60 μm in diameter, surrounded by short-celled involucral filaments.

Distribution

Fiji, Micronesia, New Caledonia, Solomon Islands, northern Australia, Indonesia, Philippines, Vietnam, China, Jamaica, tropical Americas.

Fijian Records

Kasahara 1985: 65, pl. 12, fig. 5; Garbary *et al.* 1991: 256; South 1991: 8; South and Kasahara 1992: 64.

Rotuman Distribution

Hapmafau (*HAP31, *HAP32/ USP S5: 14).

Habitat and Remarks

Epiphytic on larger algae (e.g. *Dictyota friabilis*) in tidal pools.

Dasyaceae

Heterosiphonia Montagne 1842*b*: 21

Key to the Rotuman Species of *Heterosiphonia*

1. Plants to 60 mm long, subrepent and lax with sparse determinate branches . . . *H. crispella* var. *laxa*
1: Plants to 30 mm long, erect and dense with widely divaricating, distichous pseudolateral branches . . . . . *H. subsecundata*

Heterosiphonia crispella (C. Agardh) Wynne **var. *laxa*** (Børgesen) Wynne 1985: 87; Silva *et al.* 1987: 60; Abbott 1989: 230; Price and Scott 1992: 161, fig. 56*A–D*; Wynne 1993: 15.

Heterosiphonia wurdemannii (Bailey ex Harvey) Falkenberg var. *laxa* Børgesen 1919: 327, figs 327, 328 (type locality: St. Croix, Virgin Island); Taylor 1950: 140; Dawson 1956: 57, fig. 60; 1957: 124; Taylor 1960: 565, pl. 72, fig. 9; Chapman 1963: 158, fig. 165; Dawson 1963*b*: 404, pl. 129(4), fig. 1; Womersley and Bailey 1970: 329; Jaasund 1976: 121, fig. 246; Tsuda and Wray 1977: 107; Cribb 1983: 105, pl. 64, fig. 1 (var. *laxa*); Lewis 1984: 49 (var. *laxa*); Payri and Meinesz 1985*a*: 512; Santelices and Abbott 1987: 9.

(Figs 175, 181)

Plants subrepent, about 5–6 cm long, laxly and sparingly branched. Main axis ecorticate, composed of 4 pericentral cells each about 100 μm long, 70–80 μm in diameter. Branches mostly determinate with 3–4 times forked, mainly monosiphonous filaments 10–13 μm in diameter with terminal segments 4–15 cells long, bluntly tipped. Plants sterile.

Distribution

Tropical Pacific and Indian Oceans.

Fijian Records

Garbary *et al.* 1991: 255; South and Kasahara 1992: 64 (both as *Heterosiphonia wurdemannii* (Bailey ex Harvey) Falkenberg var. *laxa*).

Rotuman Distribution

Hapmafau (*HAP27/ USP S5: 13).

Habitat and Remarks

Found as epiphytes on larger algae (e.g. *Dictyota* spp., *Dictyopteris* spp.) in sheltered tidal pools. Rotuman plants of this genus resemble var. *laxa* (Børgesen) Wynne but are noticeably smaller in axis diameter than those described in the literature (Taylor 1960; Dawson 1963).

Heterosiphonia subsecundata (Suhr) Falkenberg 1901: 643, pl. 18, fig. 20.

Dasya subsecundata Suhr 1840 (type locality unknown).

Dasya subsecunda J. Agardh 1863: 1181 (*fide* Falkenberg 1901)

Heterosiphonia callithamnion Sonder; Parsons 1975: 617 (*fide* Chapman 1971: 170).

Dasya callithamnion (Sonder) Harvey (*fide* Chapman 1971: 170).

(Figs 173, 174, 177, 179, 182, 183)

Thalli up to 30 mm high, erect, with main axis 36–51 μm in diameter with 4 pericentral cells and bearing distichous, widely divaricating pseudolateral branches. Cells of pseudolateral branches 75–83 μm long and 25–35 μm broad. Tetrasporangial stichidia shortly pedicellate, fusiform, up to 225 μm long and 5 μm in diameter, with distinct apical cell up to 10 μm high and borne laterally from thallus main axis. Tetrasporangia 15–25 μm in diameter, irregularly disposed within stichidia. Carpogonium pedicellate, up to 116 μm high and 88 μm broad, bearing subrectangular carposporangia up to 8 μm in diameter.

Distribution

Fiji, tropical seas.

Fijian Records

Chapman 1971: 170 (as *H. subsecunda*); South and Kasahara 1992: 64.

Rotuman Distribution

Hoféa (*H226/ USP S4: 14, *H228/ USP S4: 15); Ropure (*R2/ USP S5: 11).

Habitat and Remarks

Found as epiphytes on *Melanamansia glomerata*, middle reef.

Delesseriaceae

Hypoglossum Kützing 1843: 444

Hypoglossum caloglossoides Wynne and Kraft 1985: 20, figs 1–19 (type locality: Lord Howe Island, Australia); Price and Scott 1992: 137, fig. 47*A–C;* Millar and Kraft 1993: 46.

Caloglossa vieillardii Setchell 1924: 161 (non *Hypoglossum vieillardii* Kützing 1866: 4).

Caloglossa leprieurii f. *pygmaea* auct. non (von Martens) Post *sensu* Dawson 1956: 57, fig. 59; Womersley and Bailey 1970: 327; Wynne and Kraft 1985.

(Figs 176, 178, 180, 184)

Plants delicate, creeping, up to 10 mm long and with regular patterns of constrictions (nodes and internodes) which are potential points of attachment of thallus to the substratum via multicellular holdfasts composed of numerous rhizoids terminating in subpeltate knobs. Blades up to 0.6 mm wide, with branching endogenous from the thallus midrib. A transversely dividing cell terminates each axis or blade, with all 3rd-order initials reaching the thallus margin, and all cells of the 2nd-order cell row bear 3rd-order rows. Blade edges monostromatic, with radial line composed of an axial cell plus 4 pericentral cells. Plants sterile.

Distribution

Lord Howe Island, Samoa, southern Marshall Islands, Solomon Islands, Australia.

Fijian Record

N'Yeurt *et al.* 1996*b*.

Rotuman Distribution

Tua'koi (*T17/ USP S4: 13).

Habitat and Remarks

Found creeping on *Acropora* coral rubble on outer reef. There appears to exist much confusion in the literature between the genera *Caloglossa* and *Hypoglossum*, and this calls for a re-examination of other records of *Caloglossa* from deep-water habitats in the South Pacific (see Wynne and Kraft 1985).

Martensia Hering 1841: 92

Martensia elegans Hering 1841: 92 (type locality unknown); Harvey 1847: 73, pl. 43; Weber-van Bosse 1923: 386; Kylin 1956: 449; Jaasund 1976: 119, fig. 242; Tsuda and Wray 1977: 109; Lewis 1984: 46; Garrigue and Tsuda 1988: 66; Millar 1990: 417, fig. 53*A*, *B*; Millar and Kraft 1993: 47.

Hemitrema elegans R. Brown 1843.

Mesotrema elegans J. Agardh 1854: 110.

(Fig. 131)

Plants with soft pinkish-red lobes; 15–30 mm high. Periodic intercalary growth producing grid-like network, the grids being the edges of bands extended at right angles to the plane of the blades, and interconnected by anastomosing filaments from the grid walls. Plants sterile.

Distribution

Fiji, New Caledonia, Micronesia, Australia, Indonesia, Tanzania.

Fijian Records

South 1991: 9; in Herb. Institute of Marine Resources, University of the South Pacific (USP 313).

Rotuman Distribution

Hapmafau (HAP24/ USP 350).

Habitat and Remarks

Tidal pool, middle reef.

Rhodomelaceae

Melanamansia R.E. Norris 1988: 217

Melanamansia glomerata (C. Agardh) R.E. Norris 1995: 67.

Amansia glomerata C. Agardh 1822*a*: 194 (syntype localities: Hawaiian Island; 'Ravak' (Lawak), Waigeo I., Molluccas, Indonesia); J. Agardh 1863 (1851–1863): 1111; Weber-van Bosse 1923: 369; Okamura 1931: 117; Lucas 1935: 224; Yamada and Tanaka 1938: 86; Børgesen 1945: 43; Fritsch 1945: 570, fig. 212*a, e–i*; Kylin 1956: 544, fig. 436*B*; Womersley and Bailey 1970: 336; Jaasund 1976: 131, fig. 267; Tsuda and Wray 1977: 103; Magruder and Hunt 1979: 59; Cribb 1983: 106, pl. 31, fig. 1; Lewis 1984: 50; Tseng *et al.* 1984: 142, pl. 74, fig. 4; Payri and Meinesz 1985*a*: 511; Heijs 1987: 152; Lewis and Norris 1987: 22; Silva *et al.* 1987: 61; Garrigue and Tsuda 1988: 63; Norris 1988: 211, figs 1–11, (in error); Abbott 1989: 230; Coppejans and Prud'homme van Reine 1992*a*: 189; Ohba and Enomoto 1992: 32; Millar and Kraft 1993: 50; Verheij and Prud'homme van Reine 1993: 172, pl. 15, fig. 3.

(Figs 127, 128, 185, 197, 198)

Plants rose red, up to 10 cm high (mainly 4–6 cm) and forming characteristic rosettes composed of lanceolate blades up to 35 mm long and 6 mm broad, with in-rolled leaf tip and marginal teeth. Central midrib present, becoming narrower and disappearing towards the apex.. Central axial cell surrounded by 5 pericentral cells, with the first 2 dorsal pericentral cells each developing a smaller pseudo-pericentral cell that lies adjacent to the axial cell. Stem of plants thick and cartilaginous, 0.5–0.7 mm broad, denuded below. Leaves ecorticate, up to 78 mm thick, composed of 2 layers of elongate cells in V-shaped transverse rows; each cell about 33 × 13 mm in surface view. Marginal teeth up to 1.3 mm long and 445 mm broad, with 3–7 tetrasporangial stichidia in median portions of blade, spaced at about 150 mm intervals. Tetrasporangia up to 80 × 100 mm, formed in curved stichidia up to 340 mm long and 250 mm broad terminating endogenous branches (serrations) or developing adventitiously from the marginal teeth. Up to 8 tetrasporangia per stichidium.

Distribution

Hawaii, Fiji. Other reported distributions have yet to be confirmed.

Fijian Records

Askenasy 1888; Chapman 1971: 170; Kasahara 1985: 67; South 1991: 9; South and Kasahara 1992: 65; in Herb. Bishop Museum, Hawaii (BISH 512071, 623676); all as *Amansia glomerata* C. Agardh.

Rotuman Distribution

Hoféa (H222/ USP 346, H223/ USP 347, *H224/ USP S4: 20).

Habitat and Remarks

Very common on the northern Rotuman reefs ('Ahau to Oinafa), where it is often the dominant species and forms dense beds among the coral rubble on middle reef sites typically not fully exposed at low tide. These beds of *Melanamansia* offer protection for a number of other algae such as *Halimeda* and smaller species which are partially embedded within the dense algal cover.

Records of *Amansia glomerata* C. Agardh from South Africa and Mauritius have been ascribed to *A. rhodantha* (Harvey) J. Agardh by Norris (1995: 67), based on anatomical characters separating it from *Melanamansia*, namely the presence of pseudo-pericentral cells in the latter genus. Rotuman and Fijian '*Amansia glomerata*' specimens have been re-examined, and were found to belong to *Melanamansia. Melanamansia* presently occurs from the central to the western Pacific Ocean to Japan, and South Africa's east coast. The genus

Amansia probably does not extend into the Pacific (R.E. Norris, pers. comm.), and hence a re-examination of all reports of this genus in the region is called for.

Bostrychia Montagne 1842*b*: 39

Bostrychia tenella (Lamouroux) J. Agardh 1863 (1851–1863): 869; Okamura 1907: 96, pl. 22, figs 1–13; Weber-van Bosse 1923: 363; Taylor 1960: 599; Durairatnam 1961: 69; Chapman 1963: 130, fig. 135*a, b*; Womersley and Bailey 1970: 335; Dawes 1974: 154; Jaasund 1976: 127, fig. 258; Woelkerling 1976: 116, fig. 133; Tsuda and Wray 1977: 104; Cribb 1983: 106, pl. 66, figs 3, 4; Lewis 1984: 42; Tseng *et al.* 1984: 144, pl. 75, fig. 3; Lewis and Norris 1987: 22; Silva *et al.* 1987: 62; King and Puttock 1989: 34; Littler *et al.* 1989: 174; Tsuda 1991: 48; Coppejans and Prud'homme van Reine 1992*a*: 189.

Fucus tenellus Vahl 1802: 45 (type locality: St. Croix, Virgin Island).

Plocamium tenellum Lamouroux 1813: 138 (*nomen novum*).

(Figs 129, 186)

Plants 5–20 mm high, found as rather soft, dense mosslike clumps; 3 times pinnately branched with dense bilateral branching near the typically incurved tips. Aggregates almost black, individual plants dark red to purple, main axis corticated 105–170 μm in diameter, with 6–8 pericentral cells. Secondary branchlets 35–60 μm in diameter, at 170–200 μm intervals along main axis; polysiphonous, corticated below and uncorticated above. Ultimate branchlets monosiphonous 12–24 μm in diameter 10–20 cells long with individual cells 8–10 μm long.

Distribution

Fiji, Micronesia, New Caledonia, Solomon Islands, northern Australia, Indonesia, China, Florida, Caribbean, Brazil, Tanzania.

Fijian Records

Kapraun and Bowden 1978: 201; South and Kasahara 1992: 65; Raj 1993: 49, fig. 14; In Herb Bishop Museum, Hawaii (BISH 458108, 458113).

Rotuman Distribution

Paptea (P1/ USP 444, *P3/ USP S5: 19).

Habitat and Remarks

Found as dense, almost black clumps at the bases of stilt-like roots of mangrove trees (*Bruguiera gymnorhiza*) growing in an inland marine swamp about 300 m inland, intermixed with coconut groves. No other algae were found in this habitat, hence it represented an isolated population. This species was subsequently found growing on rocks, tree roots and other objects close to the low tide mark on most Rotuman shores.

As *Fucus tenellus* Vahl, the intended basionym for *Bostrychia tenella*, is a later homonym of *F. tenellus* Esper (1800: 197, pl. CIX) it is not given priority (see Silva *et al.* 1987: 62). *Plocamium tenellum* Lamouroux is treated as a *nomen novum* in accordance with Article 72, Note 1, of the ICBN.

Chondria C. Agardh 1817: xviii

Key to the Rotuman Species of *Chondria*

1. Thallus creeping ..... *C. simpliciuscula*
1: Thallus erect 2
   2. Plants dark red, up to 30 mm high, main axis to 1.5 mm in diameter ..... *C. dasyphylla*
   2: Plants reddish-purple, up to 40 mm high; main axis 400–500 μm in diameter ..... *C. sedifolia*

Chondria dasyphylla (Woodward) C. Agardh 1817: xviii; Weber-van Bosse 1923: 352; Taylor 1960: 616; Durairatnam 1961: 74, pl. 19, figs 10–11; Chapman 1963: 145, fig. 150; Jaasund 1976: 135, fig. 274; pl. 9; Dawes 1974: 155; Ngan and Price 1979: 16; Gordon-Mills 1987: 246, figs 30–57; Lewis and Norris 1987: 22; Santelices and Abbott 1987: 9; Silva *et al.* 1987: 63; Garrigue and Tsuda 1988: 64; Tsuda 1991: 50; Verheij and Prud'homme van Reine 1993: 172.

Fucus dasyphyllus Woodward 1794: 239, pl. 23, figs 1–3 (syntype localities: Cromer and Yarmouth, Norfolk, England).

(Figs 134, 188*a, b*)

Plants dark red, up to 30 mm high, with sparse and broadly pyramidal branching. Main axis 1–1.5 mm in diameter; branchlets single or clustered, constricted at the base and retuse at the apex, with central apiculus bearing a tuft of trichoblasts. Axial cell surrounded by 5 pericentral cells, each 88–120 μm in diameter. Cortex composed of 3 layers, the outermost of small oblong cells up to 12 μm in diameter; cortical cells angular in surface view. Plants sterile.

Distribution

Fiji, New Caledonia, Easter Island, northern Australia, Indonesia, Taiwan, Ryukyu Island, Philippines, Jamaica, tropical Americas, Caribbean, Ceylon, Tanzania, Europe.

Fijian Records

Garbary *et al.* 1991: 254; South and Kasahara 1992: 65.

Rotuman Distribution

Kelega; Lopta; Tua'koi (T14/ USP 475).

Habitat and Remarks

Found attached to coral rubble in tide pools, middle reef. In view of the need for a revision of the non-European records of *Chondria dasyphylla* (see Gordon-Mills 1987), the Rotuman plants cannot be firmly ascertained to belong to that species, although in vegetative characters they agree with the descriptions given by Taylor (1960) and Gordon-Mills (1987).

Chondria sedifolia Harvey 1853: 19, pl. XVIII: *G* (type locality: Key West, Florida, USA); Taylor 1928: 171, pl. 34, fig. 11; 1960: 615; Chapman 1963: 145, fig. 149; Dawes 1974: 155; Jaasund 1976: 135, fig. 273*a, b*; pl. 9; Silva *et al.* 1987: 63.

(Figs 189, 191*a, b*)

Plants dull reddish-purple, up to 40 mm high forming compact entangled mats, coarse and firm to the touch. Main axis percurrent, 400–600 μm in diameter. Branching broadly pyramidal; branchlets 400–500 μm in diameter, erect-spreading and constricted at the base, club-shaped with truncated distal ends bearing a tuft of trichoblasts. Axial cell spherical, 25–28 μm in diameter and surrounded by 5 pericentral cells 62–68 μm in diameter. Medulla composed of loosely-packed ovoid cells 40–45 μm in diameter. Cortex 2-layered; the lowermost of obovoid cells 12–15 μm in diameter, the uppermost of subrectangular cells up to 3 μm in diameter. Cortical cells rounded and loosely-packed in surface view. Tetrasporangia cruciate, dark red, 75–100 μm in diameter, clustered near the apices of fertile branchlets.

Distribution

Fiji, Philippines, Caribbean, north America, Tanzania.

Fijian Record

New record for Fiji.

Rotuman Distribution

Lopta (L37/USP 476).

Habitat and Remarks

Found as compact, entangled mats on the outer reef flat and reef rim, highly exposed to wave action and closely associated with *Turbinaria ornata, Hypnea* sp., *and Chnoospora minima.* Rotuman plants are noticeably shorter and thinner than Harvey's original decription for this species. The difference may be due to the high degree of exposure the Rotuman plants are faced with.

Chondria simpliciuscula Weber-van Bosse 1913: 125, pl. 12, figs 9–10 (type locality unknown); Tsuda and Wray 1977: 105; Price and Scott 1992: 169, fig. 59*A–E.*

(Figs 130, 133, 190*a, b*)

Plants reddish-brown, up to 3 mm high and 135–188 μm in diameter. Thallus terete and creeping, up to 17 mm long and attached to the substratum via groups of rhizoids projecting from the ventral surface of prostrate axis. Single, erect lateral fertile branchlets broadened apically, most bearing tetrasporangia 47–82 μm in diameter. Apical cell in a shallow pit, up to 7 μm high, undergoing transverse division below and surrounded by a small tuft of trichoblasts forming a characteristic apical crown up to 30 μm high. Cortical cells of main axes polygonal to isodiametric near the apices, elongate longitudinally and polygonal to ellipsoidal in mature sections, 6–8 μm in diameter and 8–15 μm long.

Distribution

Fiji, Micronesia, Australia, Indonesia.

Fijian Record

New record for Fiji.

Rotuman Distribution

Hapmafau (*HAP15/ USP S5: 15).

Habitat and Remarks

Found within *Valonia aegagropila* algal mat on exposed beach rock; back reef.

Herposiphonia Nägeli 1846: 238

Herposiphonia secunda (C. Agardh) Ambronn f. ***tenella*** (C. Agardh) Wynne 1985*a*: 173; Trono 1969: 85; Lewis 1984: 55; Payri and Meinesz 1985*a*: 512; Silva *et al.* 1987: 64; Price and Scott 1992: 175, fig. 62*A–D;* Millar and Kraft 1993: 53; Verheij and Prud'homme van Reine 1993: 173; Wynne 1993: 16.

Hutchinsia tenella C. Agardh 1828: 105 (type locality: Sicily *sensu* Silva *et al.* 1987: 64).

Herposiphonia tenella (C. Agardh) Ambronn 1880: 197; Okamura 1930(1929–1932): 23, pl. 264, figs 1–9; Taylor 1950: 147; 1960: 604, pl. 72, fig. 12; Dawson 1954: 452, fig. 59*a*; 1956: 29; 1957: 124; Durairatnam 1961: 71, pl. 28, figs 4–6; Chapman 1963: 127, fig. 133 (as *H. tenella* (C. Agardh) Naegeli); Hollenberg 1968*c*: 555, fig. 14; Dawes 1974: 158; Jaasund 1976: 129, fig. 261; Woelkerling 1976: 130, figs 241–244; Tsuda and Wray 1977: 107; Cribb 1983: 112, pl. 68, fig. 1 (f. *secunda*); Santelices and Abbott 1987: 9; Abbott 1989: 230; South and Yen 1992: 129.

Herposiphonia parca Setchell (*sensu* Tsuda 1991: 54, Price and Scott 1992: 177).

(Figs 200, 206)

Plants purplish-red, with main prostrate axis to 120 μm in diameter, and up to 12 pericentral cells. Lateral indeterminate branches arising from every 4th segment, with determinate erect branchlets arising in alternate, contiguous series of 3 from the branch primordia. Erect branches 250–560 μm long, composed of 5–9 segments and possessing 4–5 apical trichoblasts up to 15 μm in diameter and 260 μm long. Rhizoidal holdfasts at every node of the prostrate axis, to 36 μm long and 47 μm in diameter, being terminated by a concave disc-like adhering structure up to 118 μm in diameter.

Distribution

Fiji, Micronesia, Nauru, Tahiti, Hawaii, Easter Island, northern Australia, Vietnam, Ceylon, Florida, Maldives, Tanzania.

Fijian Records

Garbary *et al.* 1991: 255; South 1991: 9; South and Kasahara 1992: 65.

Rotuman Distribution

Hapmafau (*HAP29/ USP S6: 16).

Habitat and Remarks

Epiphytic on *Dictyota friabilis* in sheltered tide pools; also occurs amongst *Valonia aegagropila* mats on exposed beach rocks (e.g. at Hapmafau).

Laurencia Lamouroux 1813: 42

Key to the Rotuman Species of Laurencia

1. Plants erect ..... *L. venusta*
1: Plants repent ..... *L.* sp.

Laurencia venusta Yamada 1931*b*: 203, fig. *H*, pl. 6, fig. *A* (syntype localities: Koshiki-jima (Kagoshima Prefecture) and Goto (Nagasaki Prefecture), Japan); Saito 1967: 14, pls V and VI; text figs 8–14; Jaasund 1970*a*: 62, fig. 1*B*; 1976: 141, fig. 284; Cribb 1983: 126, pl. 36, fig. 3; Lewis 1984: 61; Lewis and Norris 1987: 23; Silva *et al.* 1987: 68; Millar and Kraft 1993: 55.

(Figs 132, 135, 187)

Fronds purplish-red, erect, up to 6 cm high; cartilaginous, somewhat rigid. Older fronds naked below and often encrusted with coralline algae; above cylindrical with percurrent main axes up to 1 mm in diameter beset with alternate, opposite or verticillate branchlets up to 900 μm in diameter. Ultimate branchlets constricted at the base, terminated by a tuft of trichoblasts in sunken apex. Cortical cells 20–30 μm in diameter, subspherical to obovoid in surface view, with lateral pit-connections. Medullary cells up to 88 μm in diameter, with abundant lenticular thickenings of the medullary cell walls, a diagnostic feature of this species. Plants sterile.

Distribution

Fiji, Australia, Philippines, Taiwan, Japan, southwest Africa.

Fijian Record

New record for Fiji.

Rotuman Distribution

Lopta (L35/ USP 477, *L50/ USP S7: 13).

Habitat and Remarks

Forming dense, compact mats on the outer reef crest in association with *Gelidiella acerosa* and *Chondria sedifolia*. Exposed to considerable wave action.

***Laurencia* sp.**

(Figs 193, 194, 201, 202)

Plants to 5 cm long and 3 mm in diameter, repent and dorso-ventrally flattened. Colour dark red to purplish. Side branchlets opposite, up to 3 mm long and terminating in a tuft of sunken apical trichoblasts. In cross-section, composed of ovoid medullary cells up to 65 μm in diameter, a cortical layer of inner cells up to 18 μm in diameter, and an outer layer of subquadrate cells 5–3 μm in diameter. Cortical cells projecting at apex; lenticular thickenings absent. Secondary pit-connections between outer cortical cells absent. Plants sterile.

Rotuman Distribution

Maka Bay (MAK19/ USP 612).

Habitat and Remarks

Mixed with *Sargassum polycystum* and *Coelothrix irregularis* within seagrass beds. This alga was examined by Professor I. A. Abbott at the University of Hawaii, but no match with any existing species could be obtained. Its status is currently under further investigation.

Polysiphonia Greville 1824: 308

Polysiphonia scopulorum Harvey 1855: 540 (type locality: Rottnest Island, Western Australia); Womersley and Bailey 1970: 330 (as var. *villum* (Harvey) Hollenberg); Tsuda and Wray 1977: 110; Cribb 1983: 132, pl. 70, figs 1–2; Lewis 1984: 55 (as *P. scopularum*); Payri and Meinesz 1985*a*: 514; Millar 1990: 445, figs 65*E–G*; Price and Scott 1992: 210, fig. 77*A–D*; Millar and Kraft 1993: 58.

var. *scopulorum* (Harvey) Hollenberg 1968*a*: 79, fig. 6*F*; Trono 1969: 83; Abbott 1989: 231.

(Fig. 207*a–d*)

Plants purplish-red, up to 5 mm high with cells mostly shorter than broad, the prostrate branches 58–65 μm in diameter with 4 pericentral cells each about 58 × 29 μm around a central axial cell about 76 × 12 μm. Erect branches up to 115 μm long and 60 μm broad, arising mostly at 2 or 3 segment intervals along the prostrate branches. The segments of the median parts of the erect branches mostly shorter than broad; the apical region of the branches bearing trichoblasts at intervals of 2or 3 segments from the tip of the branch, scar-cells present on lower parts. Trichoblasts up to 50 μm long and 9 μm in diameter, often forming lateral whorls; rhizoids up to 35 μm long and 60 μm broad, in open connection with the pericentral cells and terminated by an inflated portion up to 117 μm in diameter.

Distribution

Fiji, Caroline Islands, Hawaii.

Fijian Records

Kapraun and Bowden 1978: 201 (as *P. scopularum*), figs 23, 24; South 1992: 9; South and Kasahara 1992: 67.

Rotuman Distribution

Hapmafau (*HAP28/ USP S5: 12).

Habitat and Remarks

Epiphytic on *Valonia aegagropila* and *Dictyota friabilis* in sheltered back reef locations.

Phytobiogeographical Analysis of the Rotuman Algal Flora

Comparison of Sites on the Island

These data are graphically presented in figs 209–210. The total flora to date consists of 88 taxa. The Rhodophyta comprise the majority of the flora (46.6%; 41 taxa), with the Phaeophyta being least represented (12.5%; 11 taxa). Chlorophyta consist of 40.9% of the flora, or 36 taxa. Owing to the uncertain taxonomy of the majority of the Cyanophyceae, they are excluded from the analysis, although they are widespread at most stations.

Comparison of stations reveals marked differences in the occurence of red algae, although the green algae have a more constant distribution. There is also a marked north–south distribution pattern of certain species of Chlorophyta, especially *Halimeda* and *Caulerpa* (Fig. 211). The latter trend may reflect differences in the habitats of opposite coasts on the island, as discussed below.

Discussion

North–South Distribution Patterns

As can be seen from Fig. 211, there is marked difference in north–south distribution of Rotuman algae, especially with respect to the genera *Halimeda, Avrainvillea, Rhipilia, Melanamansia* and *Caulerpa*. This could be attributed in part to the different habitats on opposite sides of the island, which are predominantly sandy and sheltered to the north (favouring *Halimeda* and *Melanamansia* growth) and relatively rocky and exposed to the south (favouring more cryptic, robust species).

The *Caulerpa* distribution is, however, the opposite, with sites on the north coast (e.g. Lopta) being rich in clumps of relatively resistant *Caulerpa racemosa* var. *uvifera*, whereas the sandy and protected area of Hapmafau Bay at the Motusa Isthmus favours growth of larger and less robust *Caulerpa* species (*Caulerpa racemosa* var. *peltata, Caulerpa cupressoides, Caulerpa serrulata*). It should be stressed that Hapmafau Bay is not a typical southern station, most of which support robust forms of *Caulerpa serrulata* (e.g. at Tuakoi, Savlei).

A possible explanation for these distribution patterns could be the orientation of the island, which lies approximately in an east–west line. The southern coast is therefore more exposed to the south-east trade winds predominant most of the year in this part of the Pacific, resulting in significantly more wave-washed and eroded habitats. The northern coast, on the other hand, is relatively protected and this has allowed the accumulation of sandy deposits and the formation of small lagoons and tidal pools, favouring growth of such species as *Halimeda, Avrainvillea, Rhipilia* and *Melanamansia*.

Rotuma in the Context of Other South Pacific Islands

Probably the most distinctive feature about Rotuma is its isolation, as it is not geographically connected to any other island or island group. In this aspect, it resembles Lord Howe Island or Easter Island, both high volcanic islands. In size, it is much smaller than its nearest neighbouring islands in Fiji, and its combination of equatorial climate and extremely fertile volcanic soil makes it a far more productive island than most of the predominantly coral atolls to the north such as Tuvalu and Kiribati.

The small size of the island, coupled with its mostly exposed fringing reef structure, severely limits the types of algal habitats found there. There are thus marked floristic differences to be expected when comparing the island with such locations as the Solomons, Samoa, New Caledonia or Fiji, all of which have wide ranges of algal habitats. In particular,

coastal mangroves, estuarine areas and extensive lagoonal habitats are absent on Rotuma. In this respect, Rotuman algal habitats would be most comparable to small atolls such as Nauru or Kiribati.

If we consider the prevailing ocean currents in the south-western Pacific region (Ash 1992), the upstream location of Rotuma from the main Fiji group (Fig. 212) may explain the floristic differences between the two localities, as algal species would more favourably be dispersed from northerly donor areas (e.g. Micronesia) to Rotuma, while dispersal from Fiji to Rotuma is unlikely. It is pertinent to note that many species of algae so far not reported from Fiji (e.g.*Chnoospora minima*, *Chondria simpliciuscula*, *Coelarthrum boergesenii*, *Halimeda micronesica* and *Rhizoclonium africanum*) do occur in Rotuma and localities north or east of it.

Conclusions

The present study has shed some light on aspects of the Rotuman algal flora, which was totally unknown previously. While the first algal checklist for the benthic intertidal flora of that island has been produced, it revealed an apparent impoverishment of the Rotuman algal flora with respect to neighbouring island groups such as Fiji (314 spp.; South and Kasahara 1992) Micronesia (520 spp.; Tsuda and Wray 1977) and the Solomon Islands (219 spp.; Womersley and Bailey 1970). However, the severe limitations imposed by the absence of subtidal collections should be taken into consideration before making unrealistic conclusions about the richness of the algal flora on Rotuma. Nevertheless, the intrinsic limitations of the Rotuman algal habitats (which occupy mostly fringing, exposed reefs) dictate that the algal diversity found on the island should be proportionally less, with respect to much larger island groups such as Fiji.

While many new records to the Fijian flora were derived from this research, it also revealed that the Rotuman algal flora should be actually considered quite distinct and separate, based on physical, compositional, and biogeographic evidence. Indeed, while the island of Rotuma stands as a totally separate volcanic structure separated from the Fiji group by age and geology, its flora is likewise separated by the action of the prevailing ocean currents.

Still a lot is unknown about the Rotuman algal flora, especially its subtidal composition. While this preliminary research opened the way to understanding the algal communities found on intertidal Rotuman shores, further work, especially diving expeditions by SCUBA around the island's reefs, would be highly beneficial and reveal probably yet unknown aspects of the flora and possibly other new species, thereby contributing to a greater understanding of the phytobiogeography of the region. Also, there is a need to compare critical Rotuman species with type specimens, and collections from elsewhere in the region.

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Taxonomic Index

Basionyms, synonyms and misapplied names are given in italics

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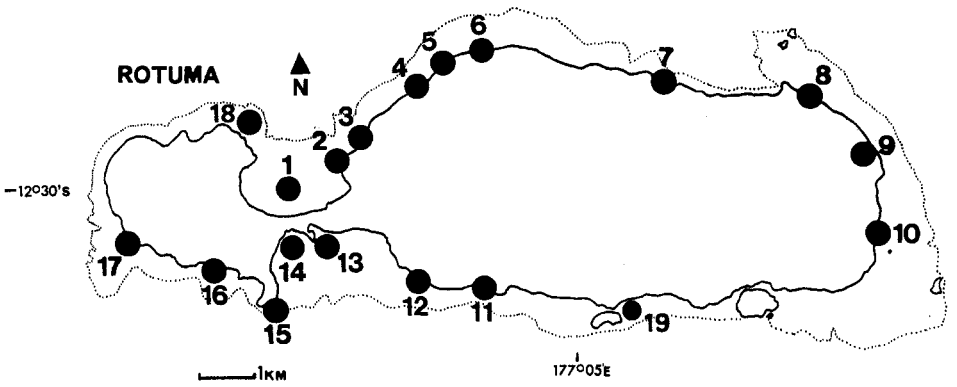

Fig. 1. Map of Rotuma Island, showing collecting sites and locations mentioned in the text. 1, Maka Bay; 2, 'Ahau; 3, Jölmea; 4, Mea; 5, Ropure; 6, Hoféa; 7, Lopta; 8, Oinafa; 9, Paptea; 10, Noa'tau; 11, Tua'koi; 12, Savlei; 13, Isilepi; 14, Hapmafau Bay; 15, Kelega; 16, Fapufa; 17, Losa; 18, Itumuta; 19, Solnohu (Juju).

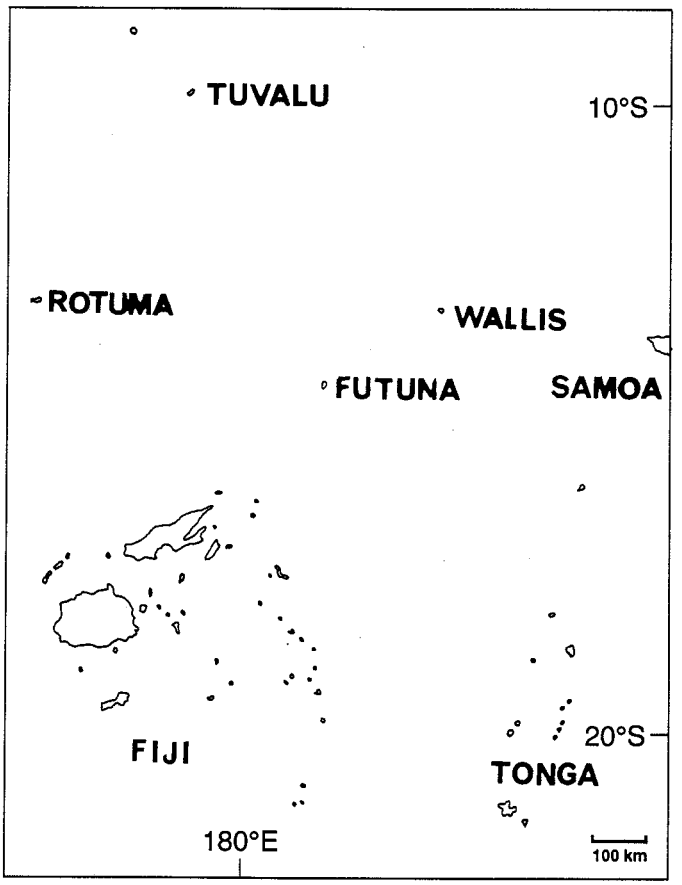

Fig. 2. Map showing the regional location of Rotuma in the context of its neighbouring island groups.

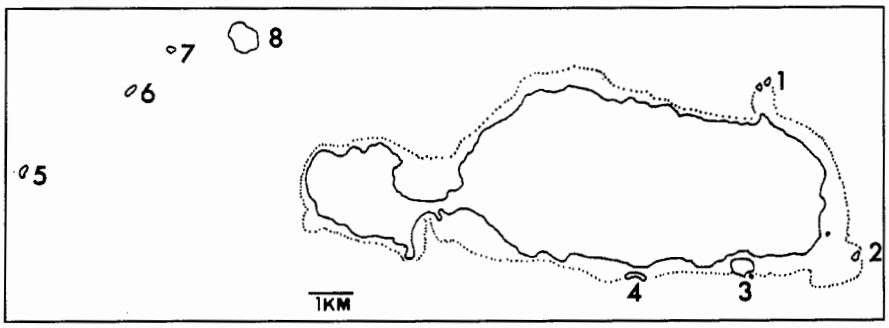

Fig. 3. Map of Rotuma Island and its surrounding islets. 1, Hauati'u and Hauamea'me'a; 2, 'Afgaha; 3, Solkope; 4, Solnohu; 5, Hafliua; 6, Hatana; 7, Hafhaveiaglolo; 8, Uea

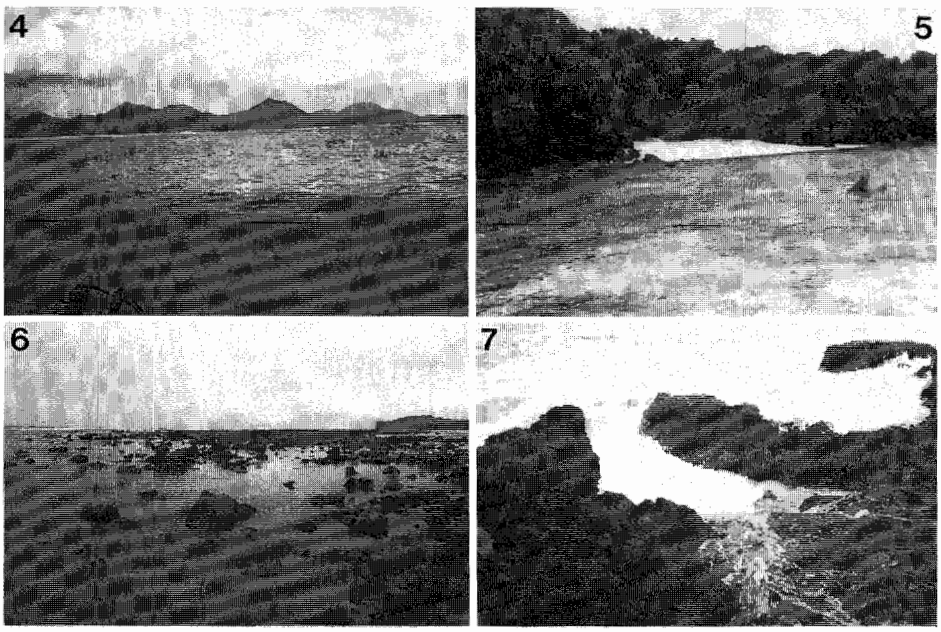

Fig. 4. General view of the Rotuman south coast, showing the regular range of hills in the island's centre (taken from Hapmafau Bay). **Fig. 5.** View of algal habitats at Losa (site of *Meristotheca procumbens* growth). **Fig. 6.** General view of Tua'koi reef at low tide. Kelega point in the background. **Fig. 7.** View of reef edge at Lopta, showing exposed conditions and growths of *Cheilosporum spectabile* hanging from coral ledges.

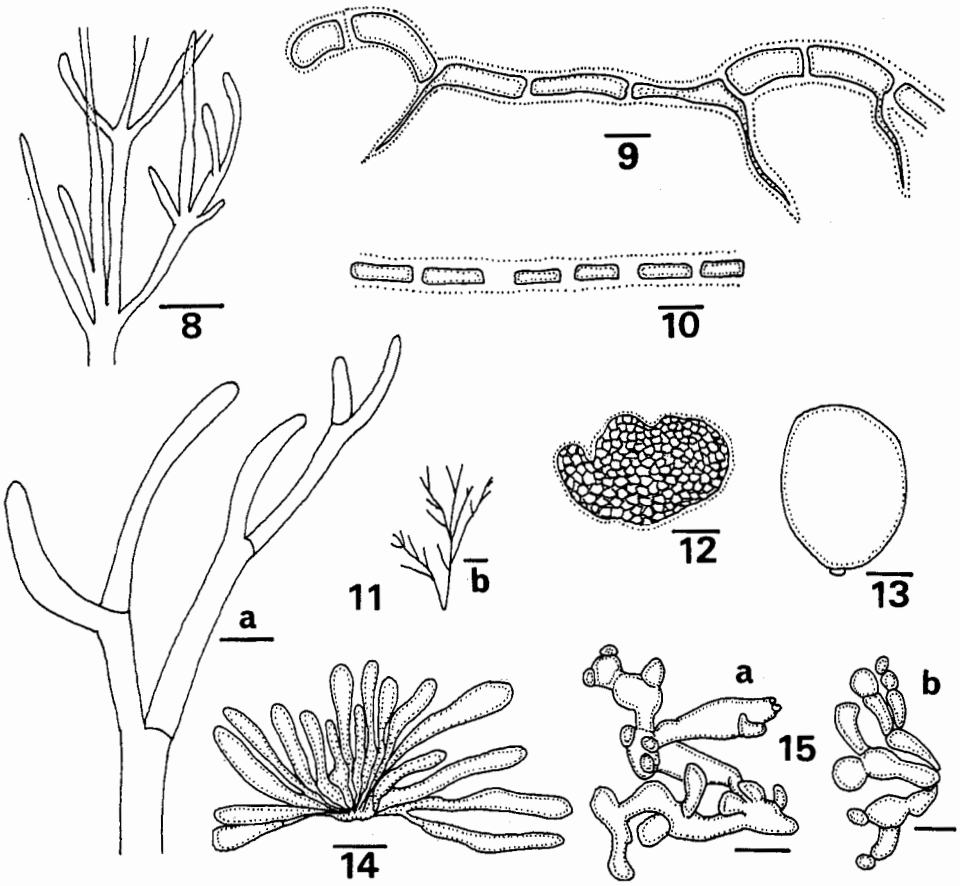

Fig. 8. *Cladophora conferta.* Scale = 200 μm. **Fig. 9.** *Rhizoclonium grande.* Scale = 200 μm. **Fig. 10.** *Rhizoclonium africanum.* Scale = 50 μm. **Fig. 11.** (*a*, *b*) *Cladophoropsis sundanensis* (*a*) Scale = 100 μm. (*b*) general habit of plant (scale = 2.5 mm). **Fig. 12.** *Dictyosphaeria cavernosa.* Scale = 5 mm. **Fig. 13.** *Ventricaria ventricosa.* Scale = 5 mm. **Fig. 14.** *Boergesenia forbesii.* Scale = 10mm. **Fig. 15.** (*a*, *b*) *Valonia aegagropila.* (Scales: *a* = 3 mm; *b* = 3 mm.)

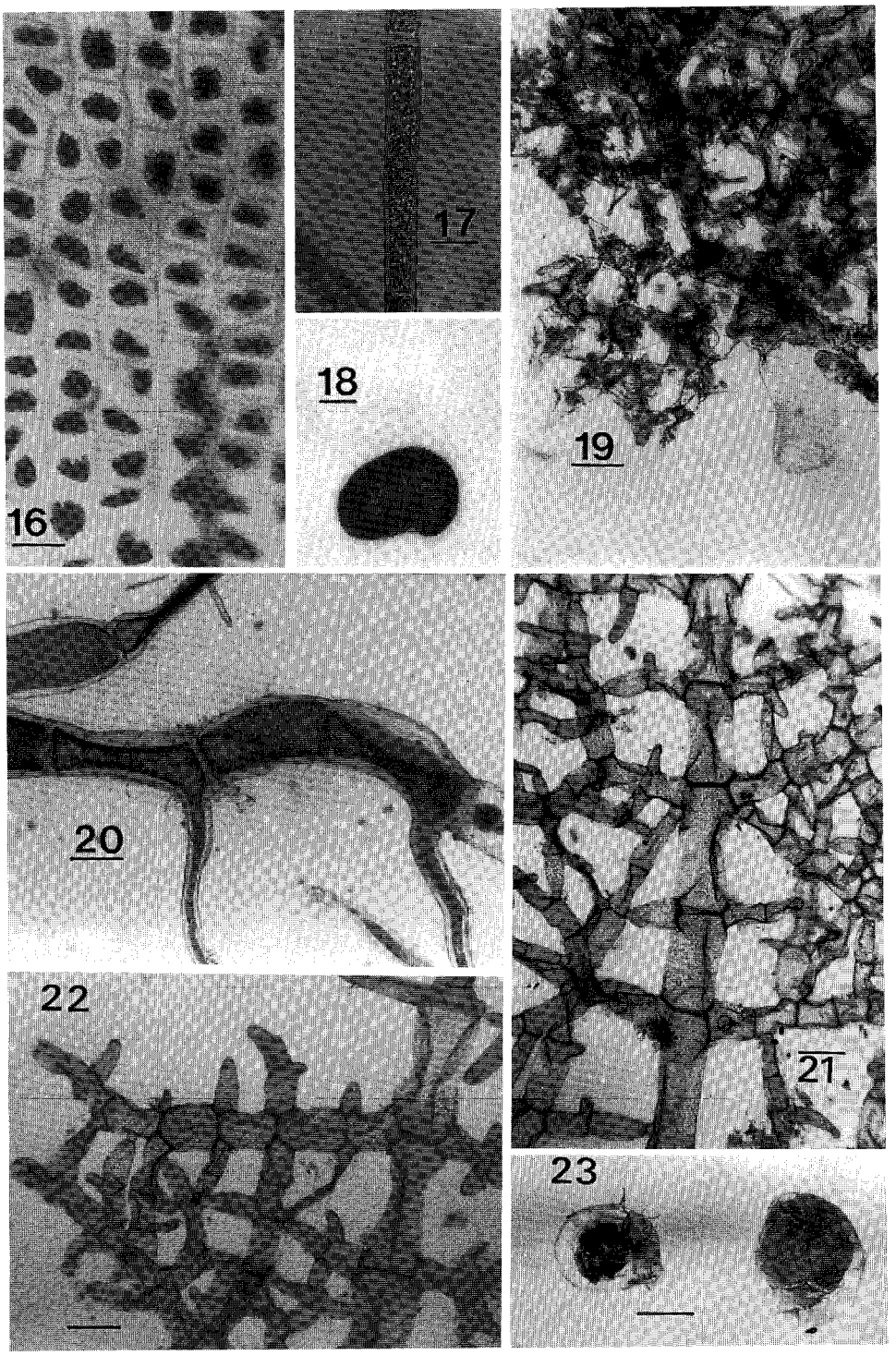

Fig. 16. *Enteromorpha flexuosa*. View of surface cells. Scale = 25 μm. **Fig. 17.** *Rhizoclonium africanum*. Scale = 25 μm. **Fig. 18.** *Codium* sp. Scale = 3 mm. **Fig. 19.** *Boodlea coacta*. Scale = 200 μm. **Fig. 20.** *Rhizoclonium grande*. Pigmented rhizoids. Scale = 200 μm. **Fig. 21.** *Struvea anastomosans*. Scale = 200 μm. **Fig. 22.** *Struvea anastomosans*. Detail of lateral branch. Scale = 200 μm. **Fig. 23.** *Ventricaria ventricosa*. Scale = 10 mm.

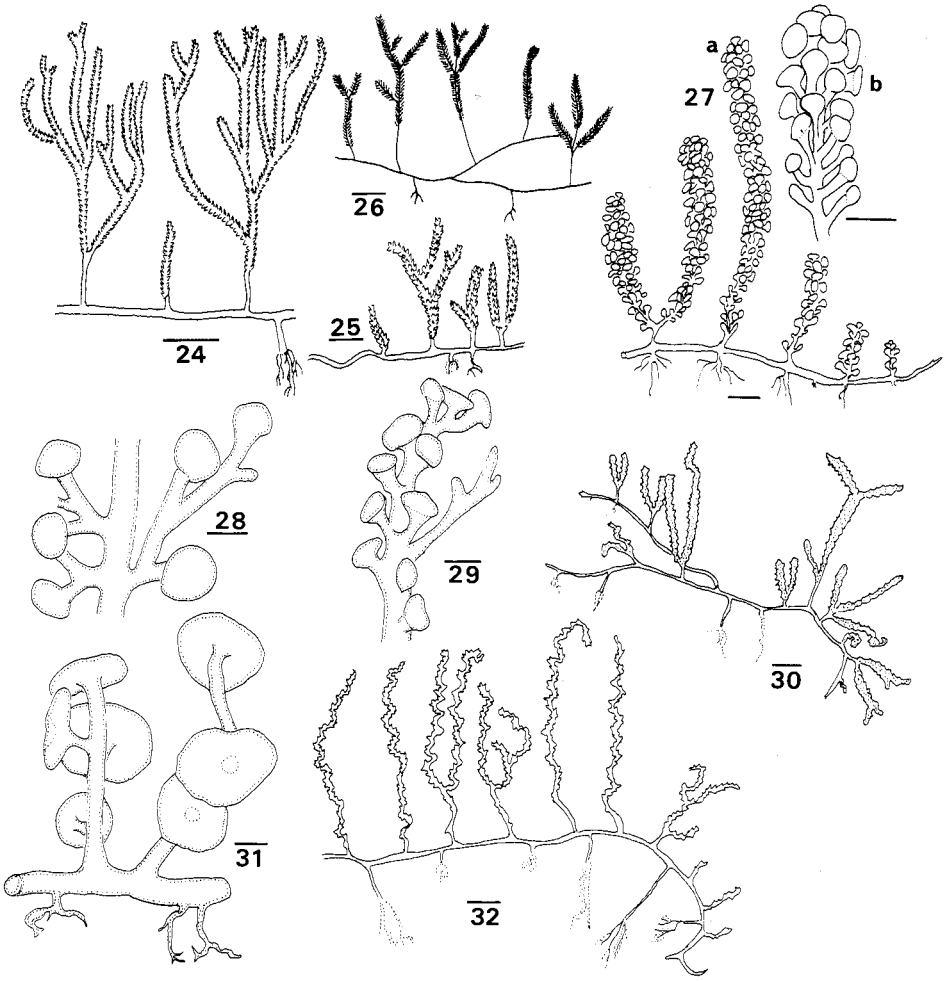

Fig. 24. *Caulerpa cupressoides*. Scale = 10 mm. **Fig. 25.** *Caulerpa cupressoides* var. *mamillosa*. Scale = 10 mm. **Fig. 26.** *Caulerpa cupressoides* var. *lycopodium* f. *elegans*. Scale = 10 mm. **Fig. 27.** (*a*, *b*) *Caulerpa racemosa* var. *uvifera*. (*a*) Habit. (*b*) Detail of erect axis. Scales: *a* = 10 mm; *b* = 2 mm. **Fig. 28.** *Caulerpa racemosa* var. *clavifera*. Scale = 1 mm. **Fig. 29.** *Caulerpa racemosa* var. *turbinata*. Scale = 2 mm. **Fig. 30.** *Caulerpa serrulata* var. *boryana* f. *occidentalis*. Scale = 10 mm. **Fig. 31.** *Caulerpa racemosa* var. *peltata*. Scale = 1 mm. **Fig. 32.** *Caulerpa serrulata*. Scale = 10 mm.

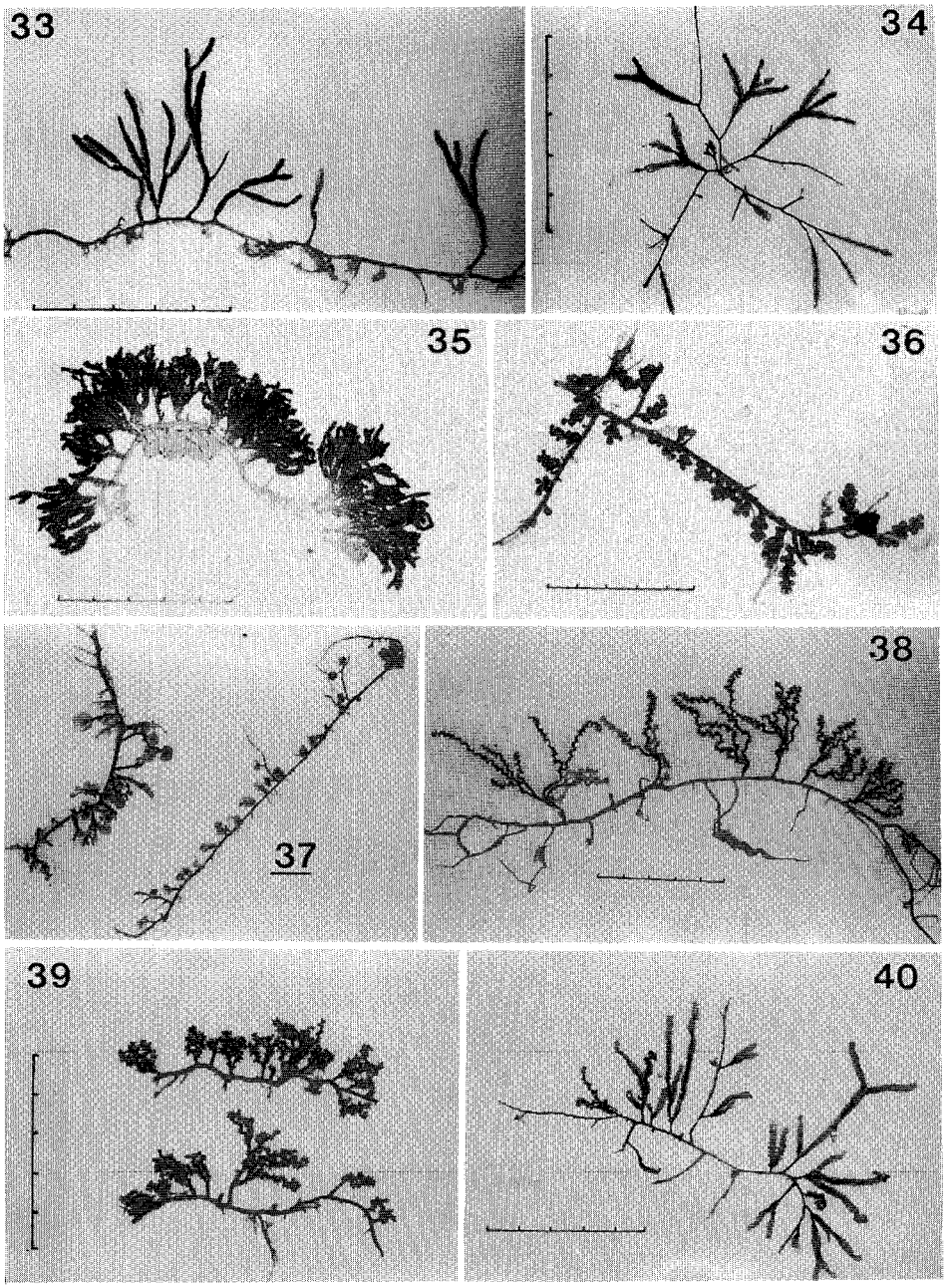

Fig. 33. *Caulerpa cupressoides* var. *lycopodium*. Scale = 5 cm. **Fig. 34.** *Caulerpa cupressoides* var. *lycopodium* f. *elegans*. Scale = 5 cm. **Fig. 35.** *Caulerpa cupressoides* var. *mamillosa*. Scale = 5 cm. **Fig. 36.** *Caulerpa racemosa* var. *clavifera*. Scale = 5 cm. **Fig. 37.** *Caulerpa racemosa* var. *peltata*. Scale = 10 mm. **Fig. 38.** *Caulerpa serrulata*. Scale = 5 cm. **Fig. 39.** *Caulerpa serrulata*. Scale = 5 cm. **Fig. 40.** *Caulerpa serrulata* var. *boryana* f. *occidentalis*. Scale = 5 cm.

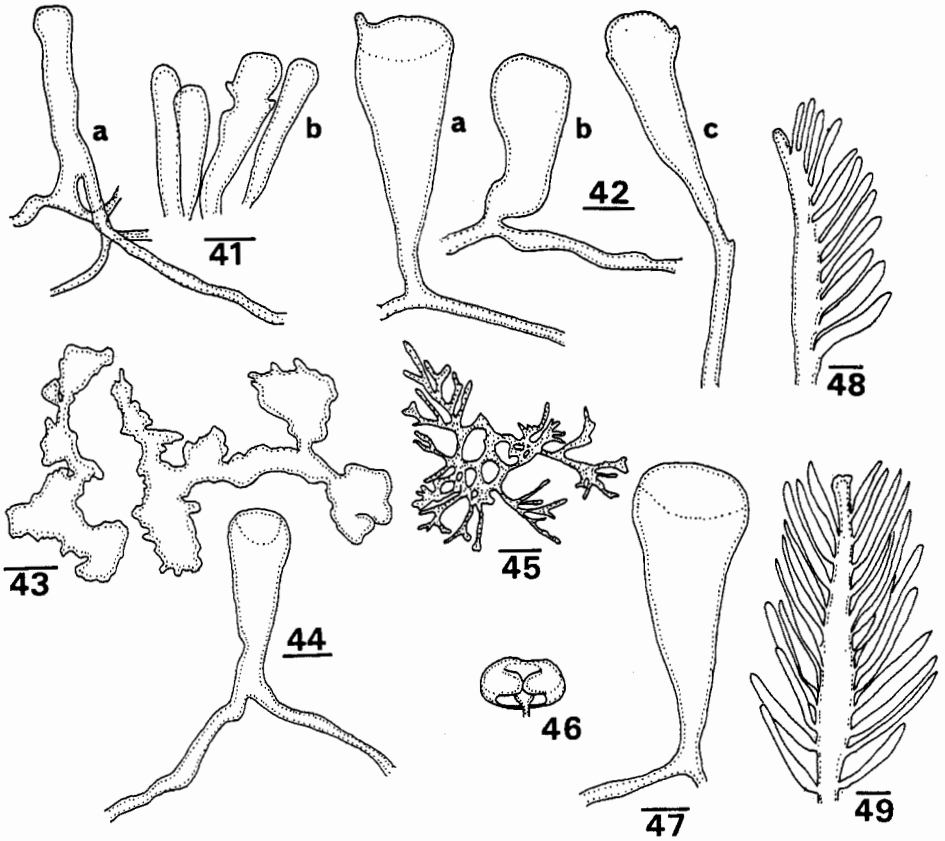

Fig. 41. (*a–c*) *Codium arabicum*. Peripheral utricles. Scale = 100 μm. **Fig. 42.** *Codium bulbopilum*. *a, b* and *c* to the same scale = 100 μm. **Fig. 43.** *Codium arabicum*. General habit. Scale = 20 mm. **Fig. 44.** *Codium* sp. Peripheral utricle. Scale = 100 μm. **Fig. 45.** *Codium bulbopilum*. Habit. Scale = 10 mm. **Fig. 46.** *Codium* sp. Habit. Scale = 10 mm. **Fig. 47.** *Codium* sp. Peripheral utricle. Scale = 100 μm. **Fig. 48.** *Bryopsis harveyana*. Detail of primary branch with unilateral secondary branchlets. Scale = 200 μm. **Fig. 49.** *Bryopsis plumosa*. Detail of branch showing bilateral arrangement of secondary branchlets. Scale = 200 μm.

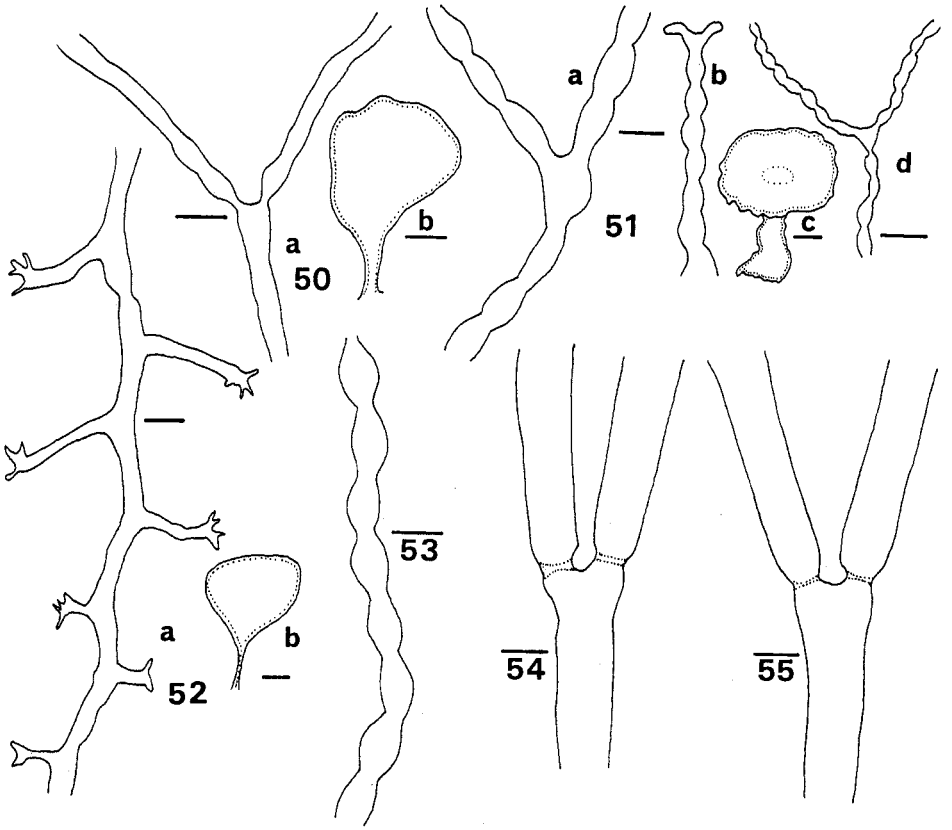

Fig. 50. *Avrainvillea amadelpha.* (*a*) Cortical siphon. (*b*) Habit of thallus. Scales: *a* = 50 μm; *b* = 5 mm. **Fig. 51.** *Avrainvillea rotumensis.* (*a, b, d*) Torulose cortical siphons. (*c*) Habit of plant. Scales: *a, b, d* = 100 μm; *c* = 20 mm. **Fig. 52.** *Rhipilia orientalis.* (*a*) Siphon with lateral appendages. (*b*) Habit of thallus. Scales: *a* = 50 μm; *b* = 5 mm. **Fig. 53.** *Avrainvillea rotumensis.* Cortical siphon. Scale = 50 μm. **Fig. 54.** *Chlorodesmis hildebrandtii.* Filament showing dichotomy with equal constrictions. Scale = 100 μm. **Fig. 55.** *Chlorodesmis major.* Filament showing equal dichotomy. Scale = 100 μm.

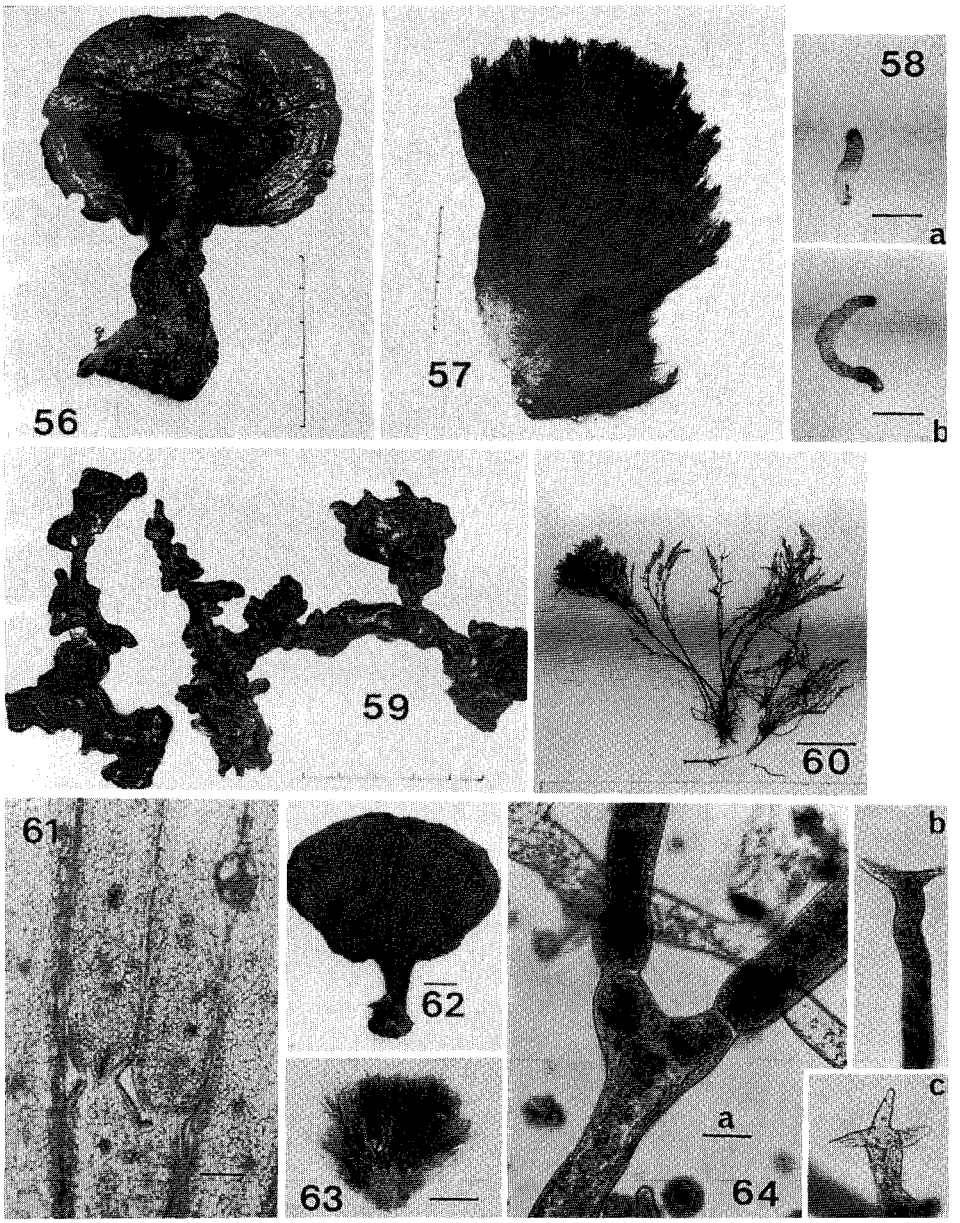

Fig. 56. *Avrainvillea rotumensis*. Habit of thallus. Scale = 5 cm. **Fig. 57.** *Chlorodesmis major*. Habit. Scale = 5 cm. **Fig. 58.** *Neomeris vanbosseae*. (*a, b*) to the same scale = 10 mm. **Fig. 59.** *Codium arabicum*. Habit. Scale = 5 cm. **Fig. 60.** *Bryopsis plumosa*. Scale = 10 mm. **Fig. 61.** *Rhipidosiphon javensis*. Parallel filaments of thallus showing characteristic unequal constrictions above dichotomy. Scale = 25 μm. **Fig. 62.** *Rhipilia orientalIsland*. Habit. Scale = 5 mm. **Fig. 63.** *Chlorodesmis hildebrandtii*. Habit. Scale = 20 mm. **Fig. 64.** (*a, b*) *Rhipilia orientalis*. (*a*) Siphon. (*b, c*) Terminal prongs of lateral appendages. Scale = 25 μm.

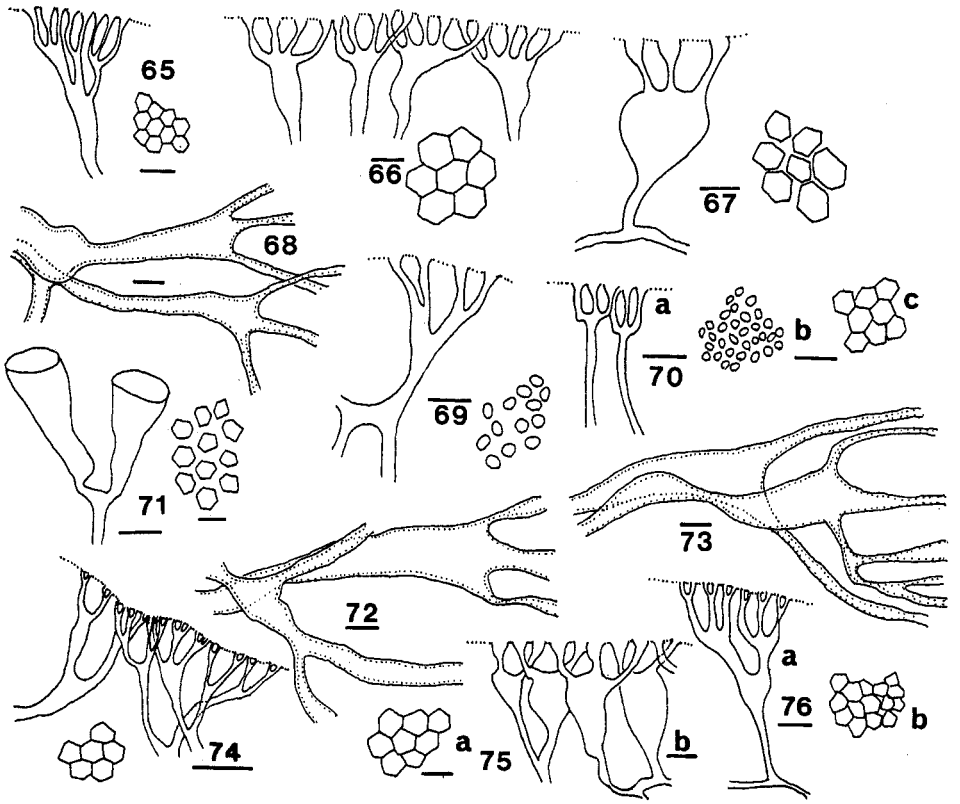

Fig. 65. *Halimeda bikinensis*. Peripheral utricles in lateral and surface view. Scale = 50 μm. **Fig. 66.** *Halimeda cuneata*. Peripheral utricles in lateral and surface view. Scale = 50 μm. **Fig. 67.** *Halimeda discoidea*. Peripheral utricles in lateral and surface view. Scale = 50 μm. **Fig. 68.** *Halimeda bikinensis*. Medullary filaments. Scale = 50 μm. **Fig. 69.** *Halimeda micronesica*. Peripheral utricles in lateral and surface view. Scale = 50 μm. **Fig. 70.** (*a, b*) *Halimeda opuntia*. (*a*) Peripheral utricles. (*b*) var. *opuntia*, surface view of peripheral utricles. (*c*) var. *hederacea*, surface view of peripheral utricles. All to the same scale = 50 μm. **Fig. 71.** (*a, b*) *Halimeda macrophysa*. (*a*) Peripheral utricles. (*b*) Surface view of peripheral utricles. Scales: *a* = 100 μm; *b* = 200 μm. **Fig. 72.** *Halimeda taenicola*. Medullary filaments. Scale = 50 μm. **Fig. 73.** *Halimeda tuna*. Medullary filaments. Scale = 50 μm. **Fig. 74.** *Halimeda taenicola*. Peripheral utricles in lateral and surface view. Scale = 100 μm. **Fig. 75.** (*a, b*) *Halimeda tuna*. (*a*) Surface view of peripheral utricles. (*b*) Peripheral utricles in lateral view. Scales: *a* = 50 μm; *b* = 50 μm. **Fig. 76.** *Halimeda simulans*. Peripheral utricles in lateral and surface view. Scale = 50 μm.

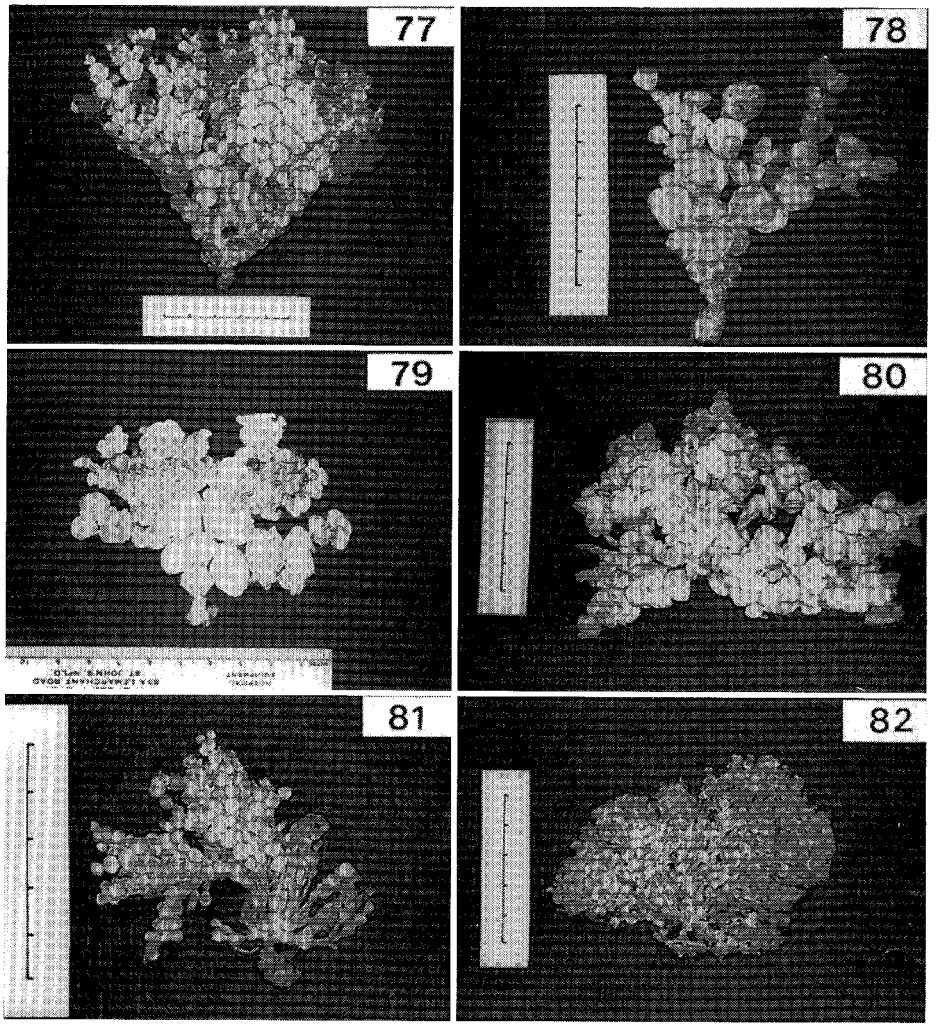

Fig. 77. *Halimeda bikinensis.* Scale = 5 cm. **Fig. 78.** *Halimeda cuneata.* Scale = 5 cm. **Fig. 79.** *Halimeda discoidea.* Scale = 5 cm. **Fig. 80.** *Halimeda macrophysa.* Scale = 5 cm. **Fig. 81.** *Halimeda micronesica.* Characteristic fan-shaped basal segment. Scale = 5 cm. **Fig. 82.** *Halimeda micronesica.* Scale = 5 cm.

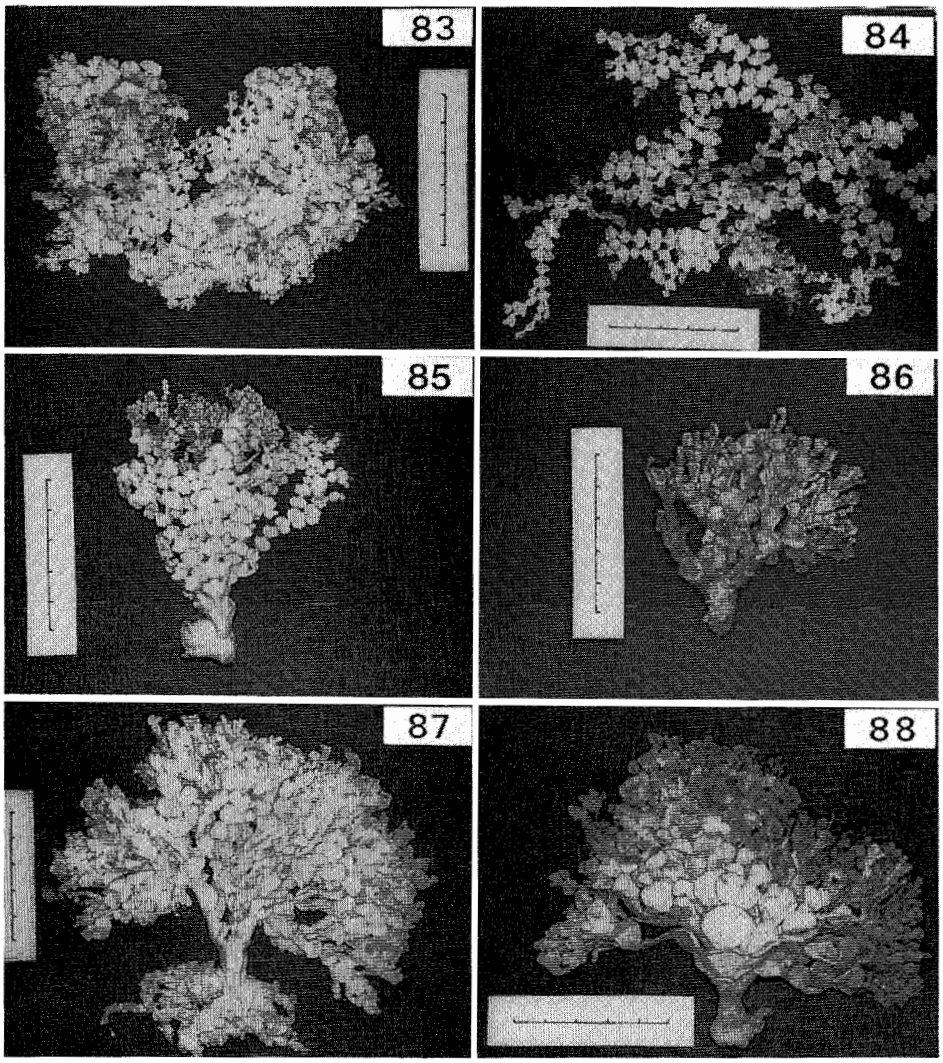

Fig. 83. *Halimeda opuntia* var. *opuntia*. Scale = 5 cm. **Fig. 84.** *Halimeda opuntia* var. *hederacea*. Scale = 5 cm. **Fig. 85.** *Halimeda simulans*. Scale = 5 cm. **Fig. 86.** *Halimeda taenicola*. Scale = 5 cm. **Fig. 87.** *Halimeda tuna*. Scale = 5 cm. **Fig. 88.** *Halimeda tuna*. Scale = 5 cm.

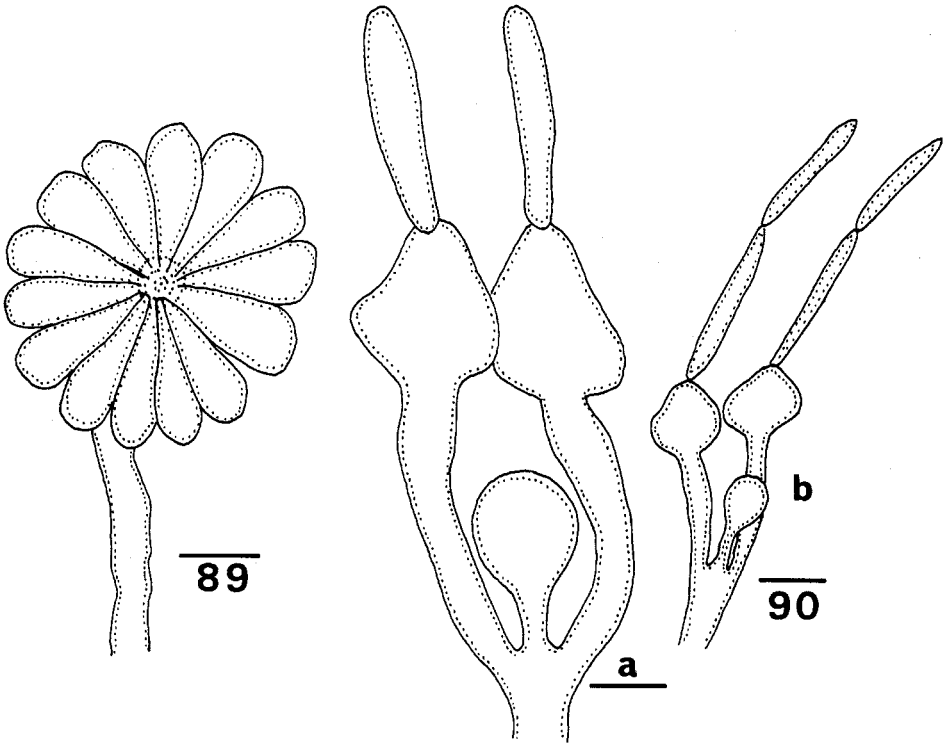

Fig. 89. *Polyphysa parvula*. Scale = 500 μm.
Fig. 90. (*a*, *b*) *Neomeris vanbosseae*. (*a*, *b*) Cortical assimilatory cells with sporangial cyst between them. Both scales = 100 μm.

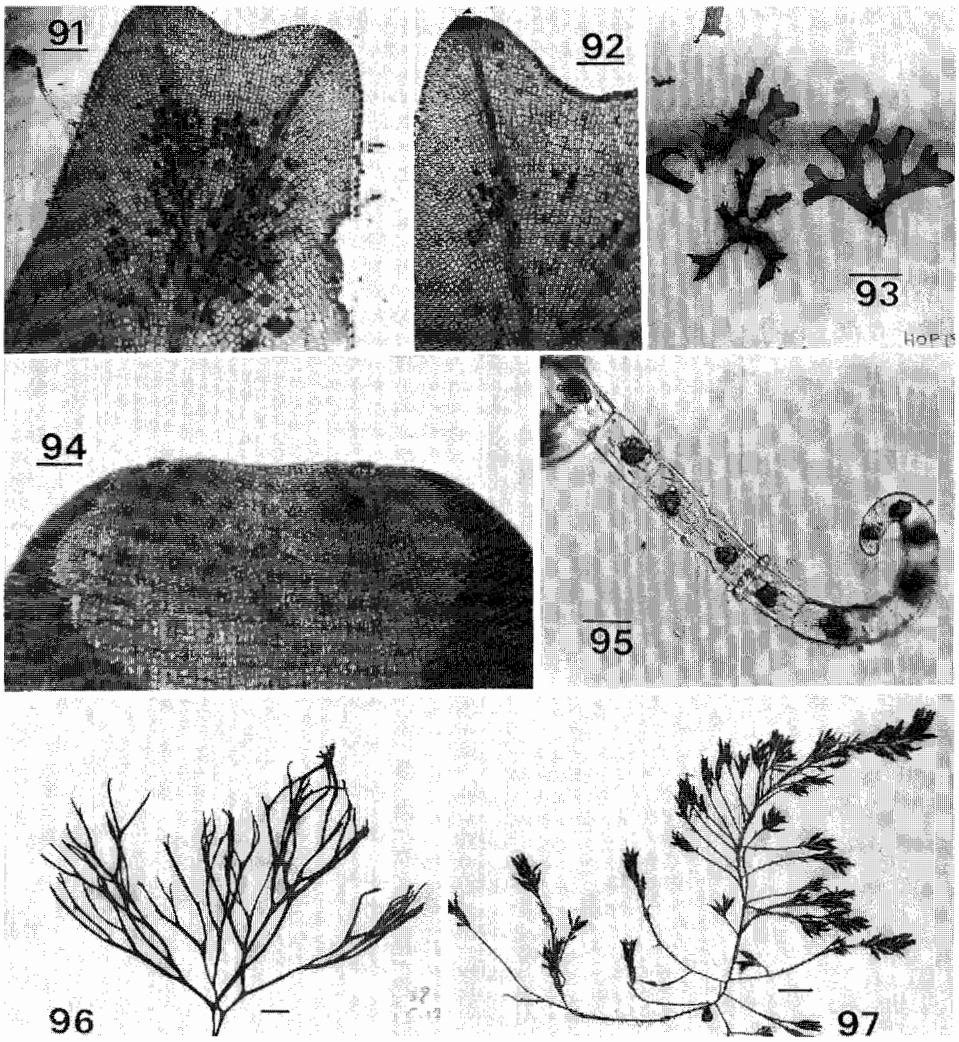

Fig. 91. *Dictyopteris repens*. Detail of blade showing sporangia. Scale = 200 μm. **Fig. 92.** *Dictyopteris repens*. Detail of blade showing apical cell (arrow). Scale = 200 μm. **Fig. 93.** *Dictyota friabilis*. Scale = 10 mm. **Fig. 94.** *Dictyota friabilis*. Paired apical cells. Scale = 200 μm. **Fig. 95.** *Hincksia breviarticulata*. Hooked secondary branchlet. Scale = 25 μm. **Fig. 96.** *Chnoospora minima*. Habit. Scale = 5 mm. **Fig. 97.** *Sargassum polycystum*. Habit. Scale = 20 mm.

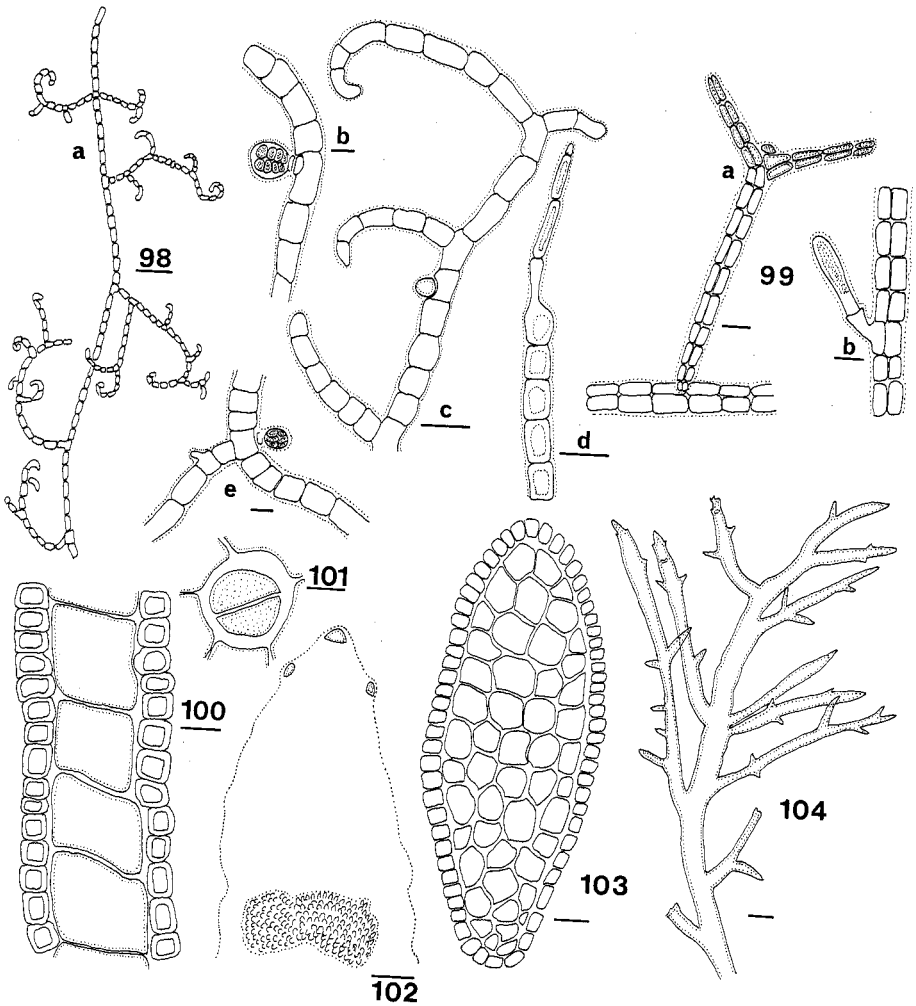

Fig. 98. (*a–e*) *Hincksia breviarticulata*. (*a*) Individual filament with hooked laterals. (*b, e*) Filament bearing plurilocular sporangia. (*c, d*) Detail of secondary branchlets. Scales: *a* = 200 μm; *b, e* = 25 μm; *c, d* = 50 μm. **Fig. 99.** (*a, b*) *Sphacelaria* rigidula. (*a*) Propagula with convex apical cell. (*b*) Lateral unilocular sporangia. Scales: *a, b* = 25 μm. **Fig. 100.** *Dictyota friabilis*.Cross-section showing tristromatic blade. Scale = 25 μm. **Fig. 101.** *Dictyota friabilis*. Sporangia. Scale = 25 μm. **Fig. 102.** *Dilophus radicans*. Branch apex showing apical cell and subapicular sporangia. Scale = 100 μm. **Fig. 103.** *Dilophus radicans*. Cross-section of thallus. Scale = 50 μm. **Fig. 104.** *Dilophus radicans*. Habit. Scale = 1 mm.

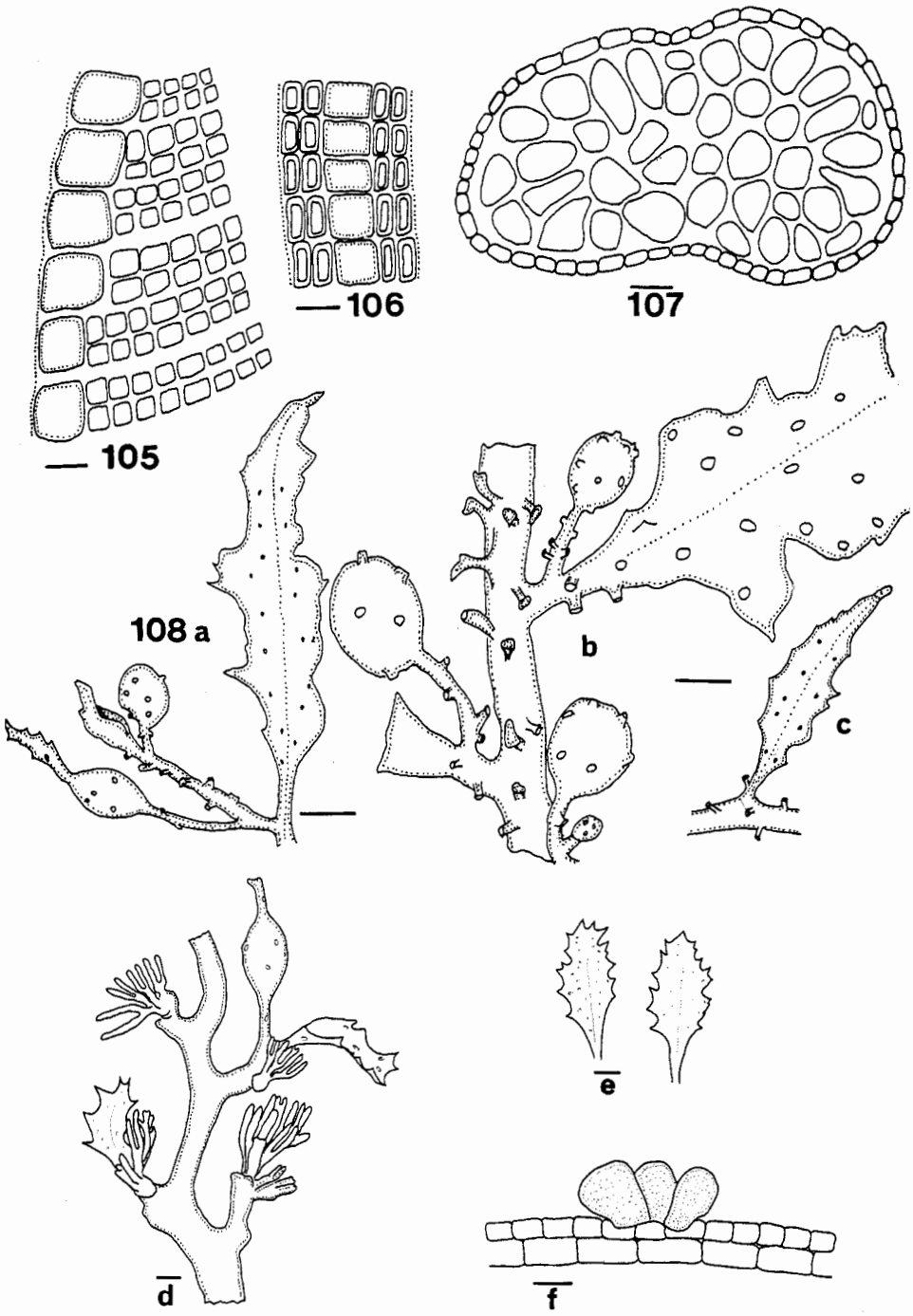

Fig. 105. *Lobophora variegata.* Marginal row of apical cells. Scale = 25 μm. **Fig. 106.** *Lobophora variegata.* Cross-section showing pentastromatic thallus. Scale = 25 μm. **Fig. 107.** *Chnoospora minima.* Cross-section of thallus. Scale = 25 μm. **Fig. 108.** (*a–c*) *Sargassum polycystum.* (*a, b*) Detail of thallus showing pedunculate vesicles and Y-shaped proliferations. (*c*) Detail of lanceolate leaf. All scales = 2 mm. (*d, e*) *Sargassum* sp. (*d*) Detail of thallus showing fusiform vesicle, smooth main axis and cymose receptacular branches. (*e*) Detail of obovate leaves from mid-thallus. Scales: *d* = 2 mm, *e* = 5 mm. (*f*) *Padina tenuis.* Cross-section of thallus showing non-indusiate sporangia. Scale = 50 μm.

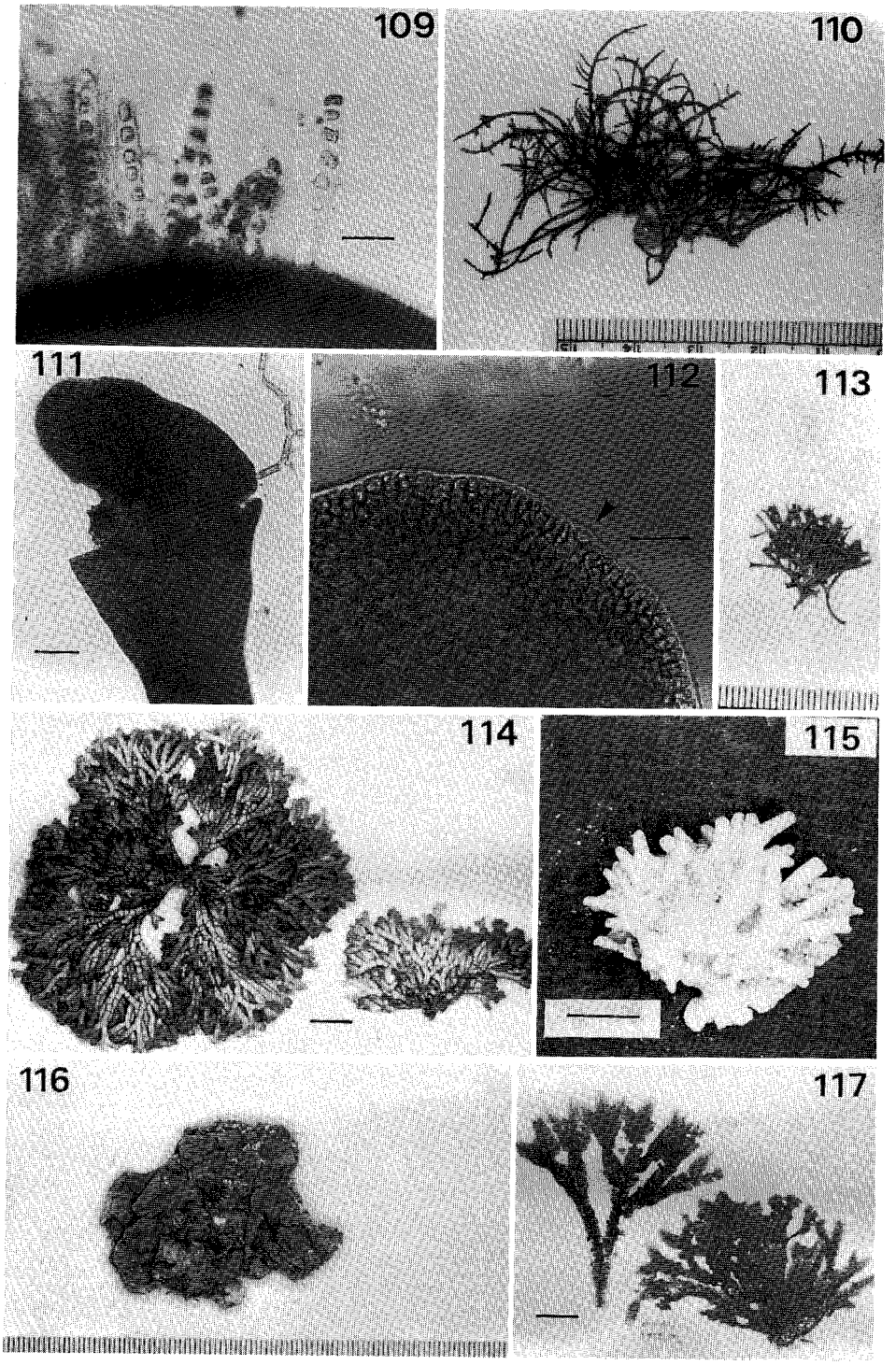

Fig. 109. *Erythrotrichia carnea.* Scale = 25 μm. **Fig. 110.** *Gelidiella acerosa.* Habit. Scale in mm. **Fig. 111.** *Gelidium pusillum.* Blade with epiphytic chain-diatom. Scale = 100 μm. **Fig. 112.** *Gelidium pusillum.* Blade apex showing single apical cell (arrow). Scale = 20 μm. **Fig. 113.** *Actinotrichia fragilis.* Habit. Scale in mm. **Fig. 114.** *Liagora valida.* Scale = 10 mm. **Fig. 115.** *Lithophyllum tamiense.* Scale = 10 mm. **Fig. 116.** *Peyssonnellia* sp. Scale in mm. **Fig. 117.** *Cheilosporum spectabile.* Scale = 10 mm.

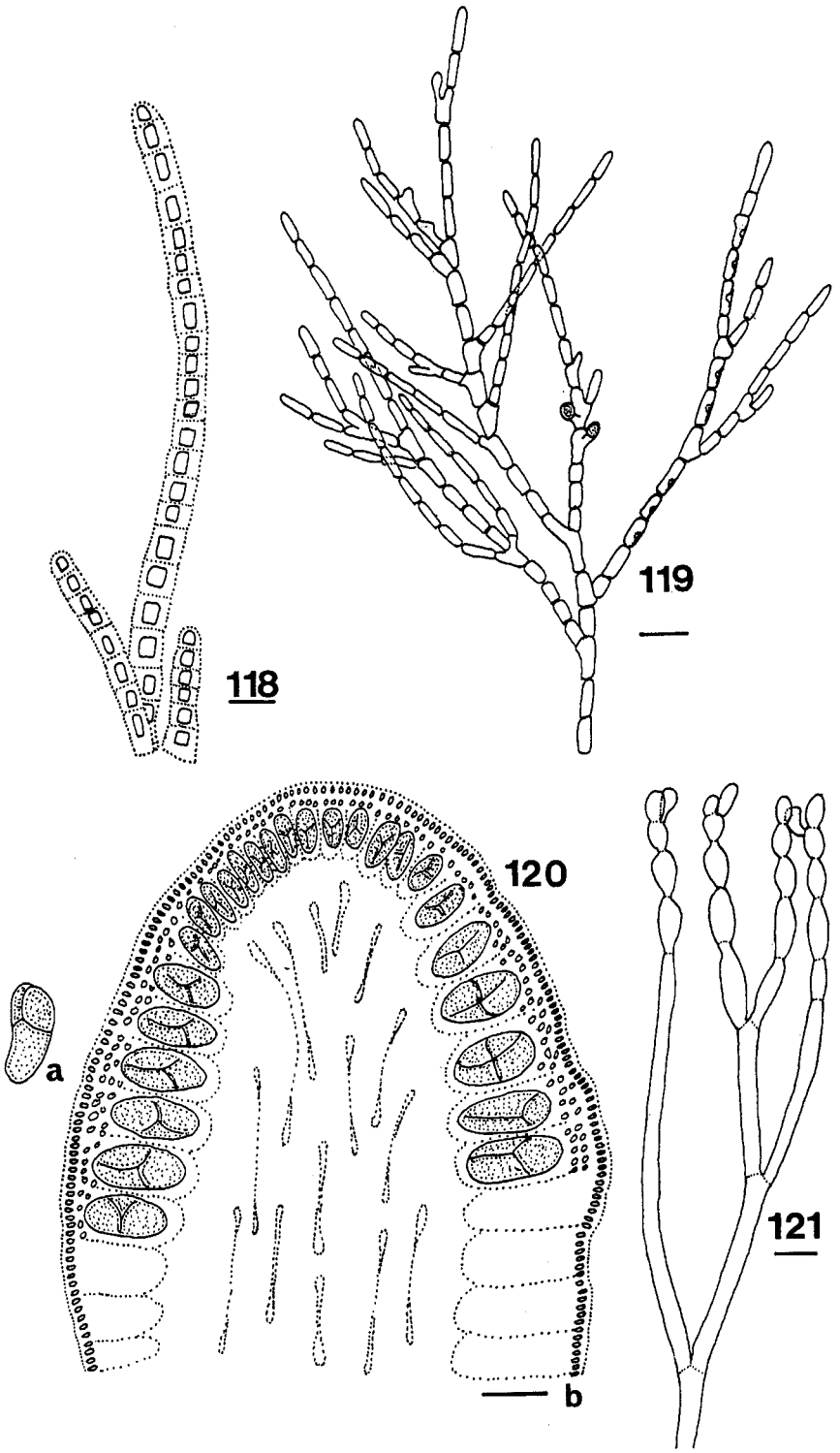

Fig. 118. *Erythrotrichia carnea.* Scale = 25 μm. **Fig. 119.** *Audouinella polyblasta.* Scale = 25 μm. **Fig. 120.** *Gelidiella acerosa.* Lateral section of fertile side branchlet, showing cruciate sporangia. (*a*) Detail of sporangia. Scales: *a*, *b* = 50 μm. **Fig. 121.** *Liagora valida.* Assimilatory filaments. Scale = 25 μm.

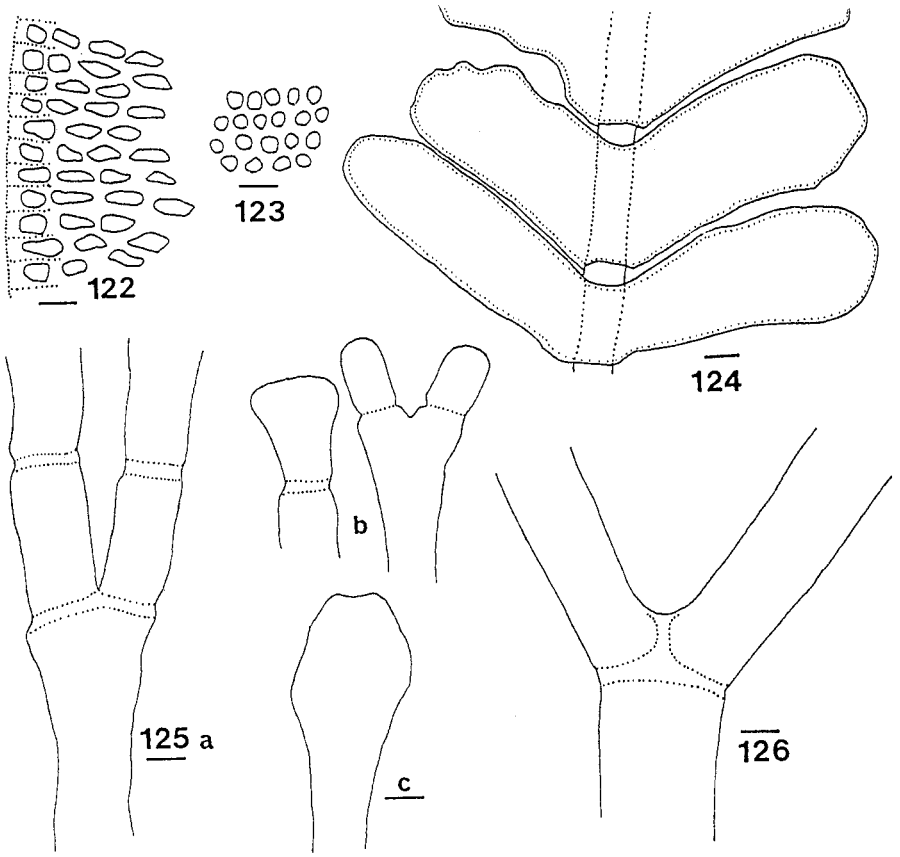

Fig. 122. *Peyssonnelia* sp. Cross-section of thallus. Scale = 25 μm. **Fig. 123.** *Peyssonnelia* sp. Surface view of thallus. Scale = 25 μm. **Fig. 124.** *Cheilosporum spectabile*. Branch lobes. Scale = 200 μm. **Fig. 125.** (*a–c*) *Jania rubens*. (*a*) Dichotomous branching. (*b*) Branch apex. (*c*) Terminal conceptacle. All to the same scale = 100 μm. **Fig. 126.** *Jania adhaerens*. Detail of branching angle. Scale = 100 μm.

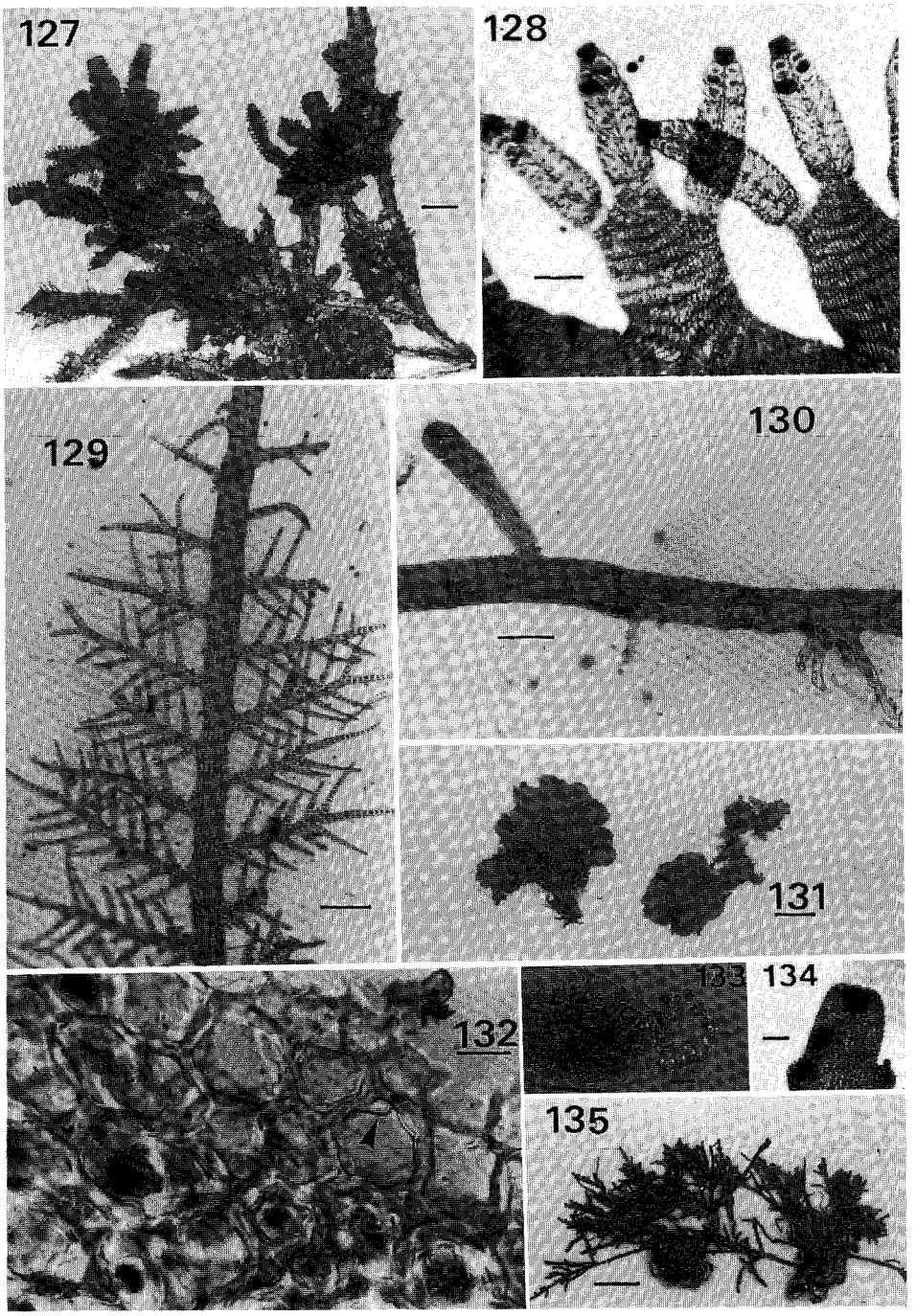

Fig. 127. *Melanamansia glomerata.* Habit. Scale = 5 mm. **Fig. 128.** *Melanamansia glomerata.* Marginal stichidia bearing tetrasporangia. Scale = 200 μm. **Fig. 129.** *Bostrychia tenella.* Scale = 200 μm. **Fig. 130.** *Chondria simpliciuscula.* Habit. Scale = 200 μm. **Fig. 131.** *Martensia elegans.* Habit. Scale = 5 mm. **Fig. 132.** *Laurencia venusta.* Cross-section of thallus showing characteristic lenticular thickenings of medullary cells (arrow). Scale = 25 μm. **Fig. 133.** *Chondria simpliciuscula.* Detail of apical region, showing apical cell and apical crown of trichoblasts. Scale = 25 μm. **Fig. 134.** *Chondria dasyphylla.* Scale = 100 μm. **Fig. 135.** *Laurencia venusta.* Habit. Scale = 5 mm.

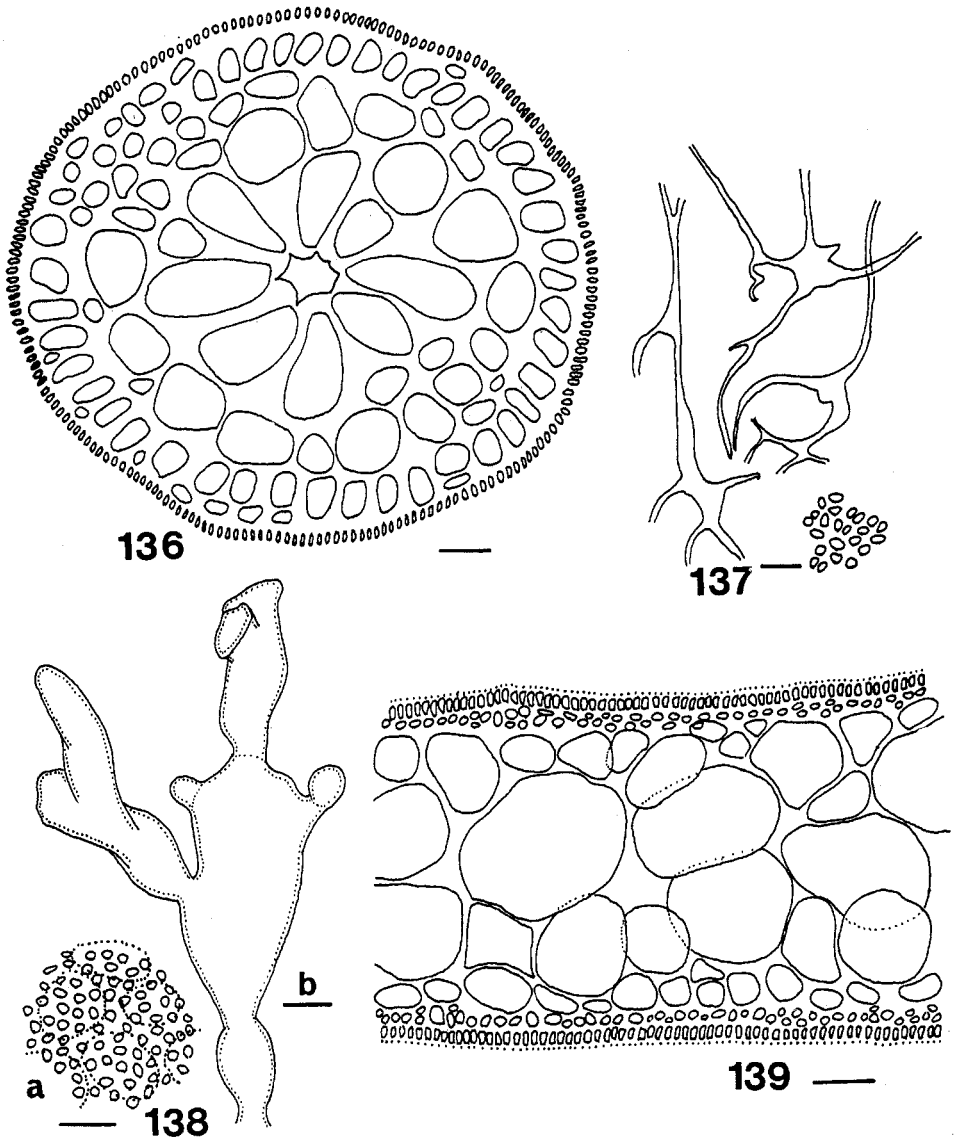

Fig. 136. *Hypnea nidulans*. Cross-section of thallus. Scale = 25 μm. **Fig. 137.** *Meristotheca procumbens*. Stellate medullary cells and surface view of thallus. Scale = 25 μm. **Fig. 138.** (*a*, *b*) *Coelarthrum boergesenii*. (*a*) Surface view of cortical cells. (*b*) Habit. Scales: *a* = 25 μm; *b* = 1.5 mm. **Fig. 139.** *Rhodymenia divaricata*. Cross-section of thallus. Scale = 50 μm.

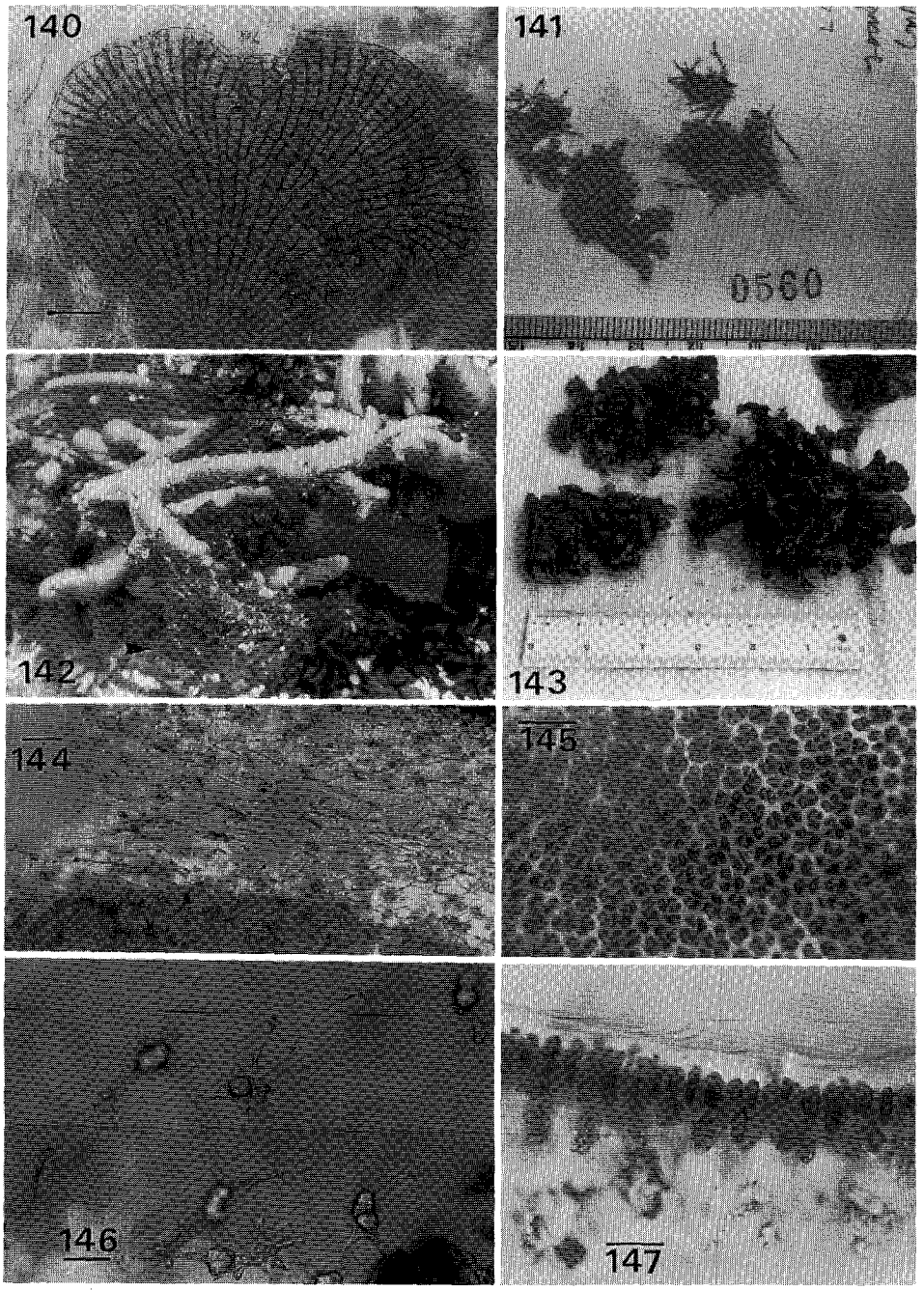

Fig. 140. *Hydrolithon farinosum.* Showing radially arranged quadrangular cells. Scale = 50 μm. **Fig. 141.** *Jania rubens.* Habit. Scale in mm. **Fig. 142.** *Meristotheca procumbens.* Habit of thallus *in situ,* showing attachment to *Acropora* rubble (arrow). **Fig. 143.** *Meristotheca procumbens.* Habit of living specimens shortly after collecting. **Fig. 144.** *Meristotheca procumbens.* Cross-section of thallus showing medullary region of stellate cells. Scale = 100 μm. **Fig. 145.** *Meristotheca procumbens.* Surface view of cortical cells. Scale = 20 μm. **Fig. 146.** *Meristotheca procumbens.* Detail of medullary stellate cells. Scale = 25 μm. **Fig. 147.** *Meristotheca procumbens.* Cross-section of cortex showing rectangular cortical cells. Scale = 20 μm.

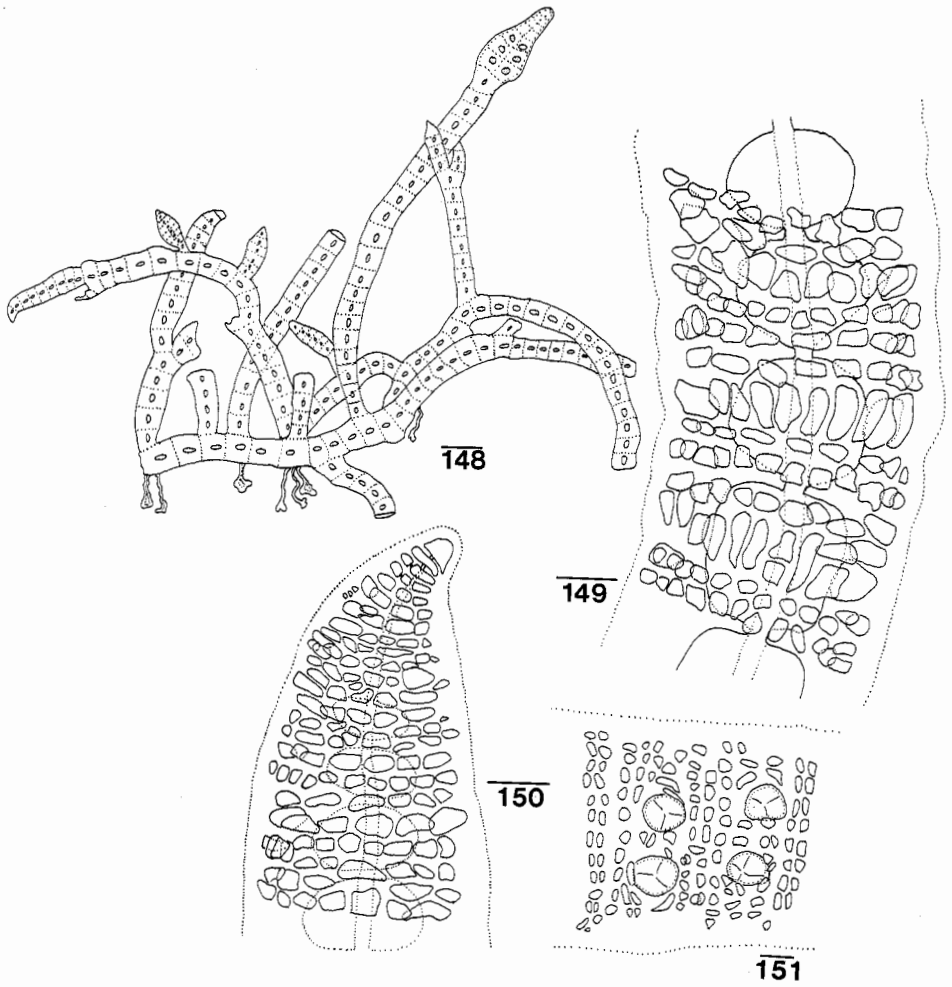

Fig. 148. *Centroceras apiculatum.* Habit. Scale = 200 μm. **Fig. 149.** *Centroceras apiculatum.* Detail of thallus cortication. Scale = 25 μm. **Fig. 150.** *Centroceras apiculatum.* Tip of branch showing transversally-dividing apical cell. Scale = 25 μm. **Fig. 151.** *Centroceras apiculatum.* Detail of fertile branch showing cruciate tetraspores. Scale = 25 μm.

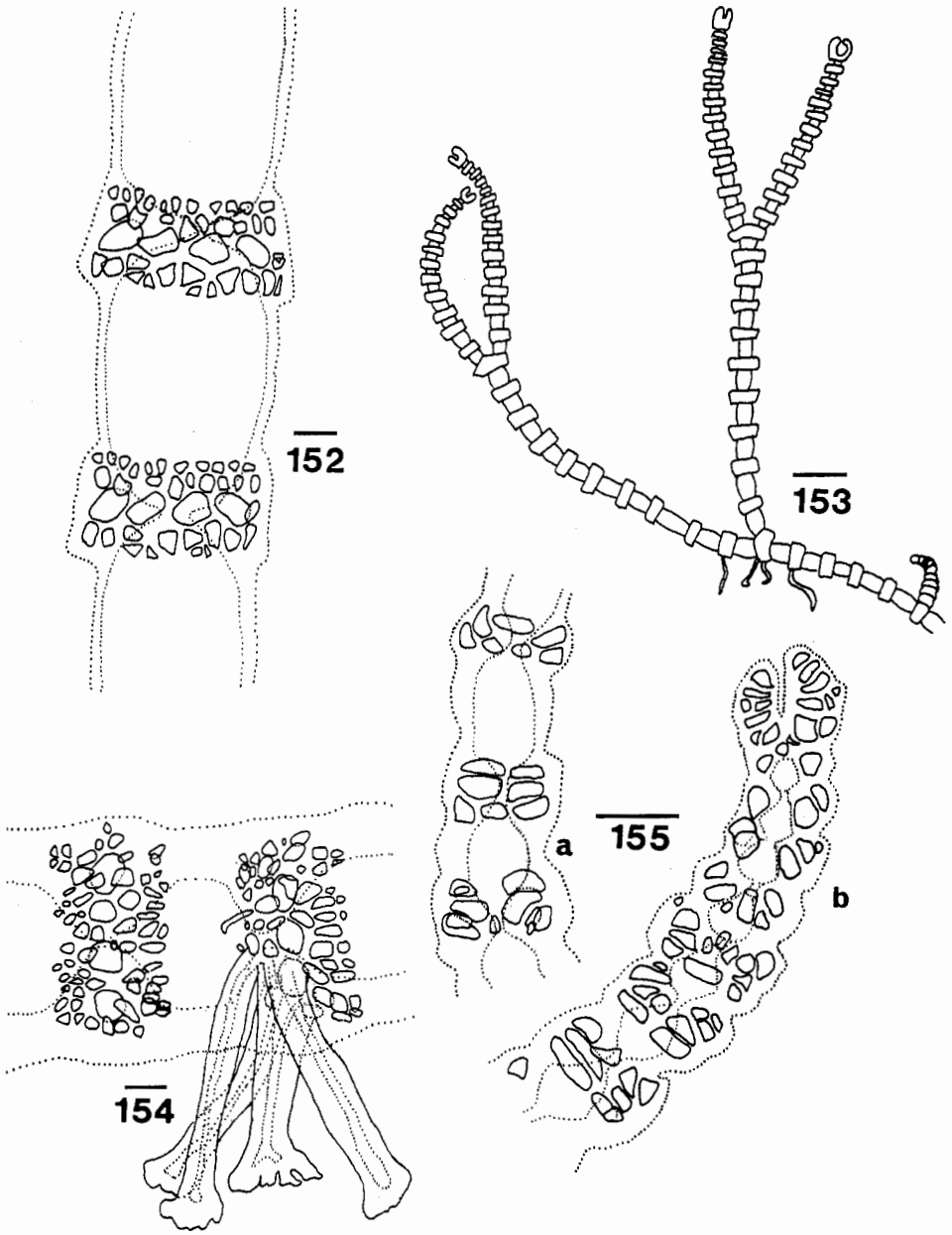

Fig. 152. *Ceramium zacae*. Detail of cortical bands. Scale = 25 μm. **Fig. 153.** *Ceramium zacae*. Habit of thallus. Scale = 200 μm. **Fig. 154.** *Ceramium vagans*. Detail of creeping thallus with hyaline rhizoids projecting from ventral nodal surface. Scale = 25 μm. **Fig. 155.** (*a, b*) *Ceramium codii*. (*a*) Detail of cortical bands. (*b*) Thallus apex, showing apical cells. Both same scale = 25 μm.

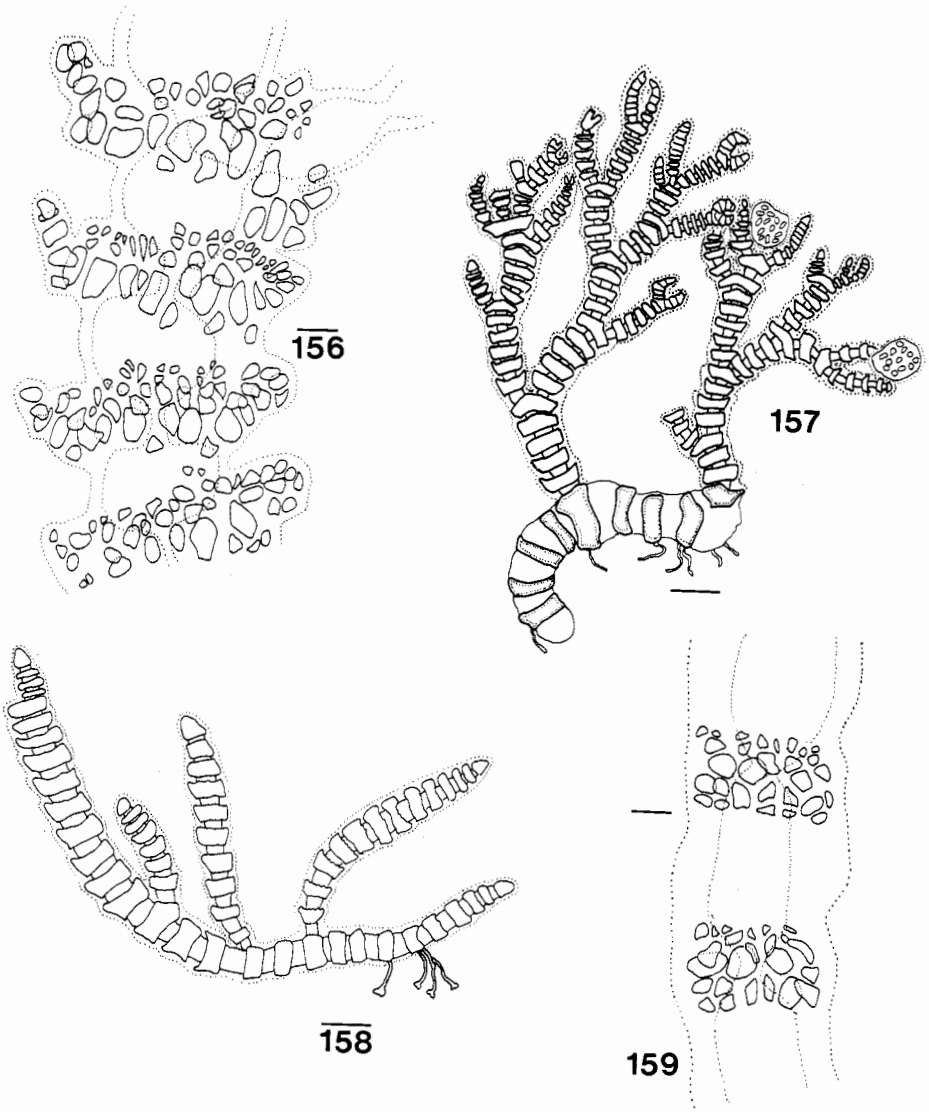

Fig. 156. *Ceramium mazatlanense*. Detail of cortical bands, showing characteristic upward-curving edges. Scale = 25 μm. **Fig. 157.** *Ceramium mazatlanense*. Habit. Scale = 200 μm. **Fig. 158.** *Ceramium vagans*. Habit. Scale = 200 μm. **Fig. 159.** *Ceramium vagans*. Detail of cortical bands. Scale = 25 μm.

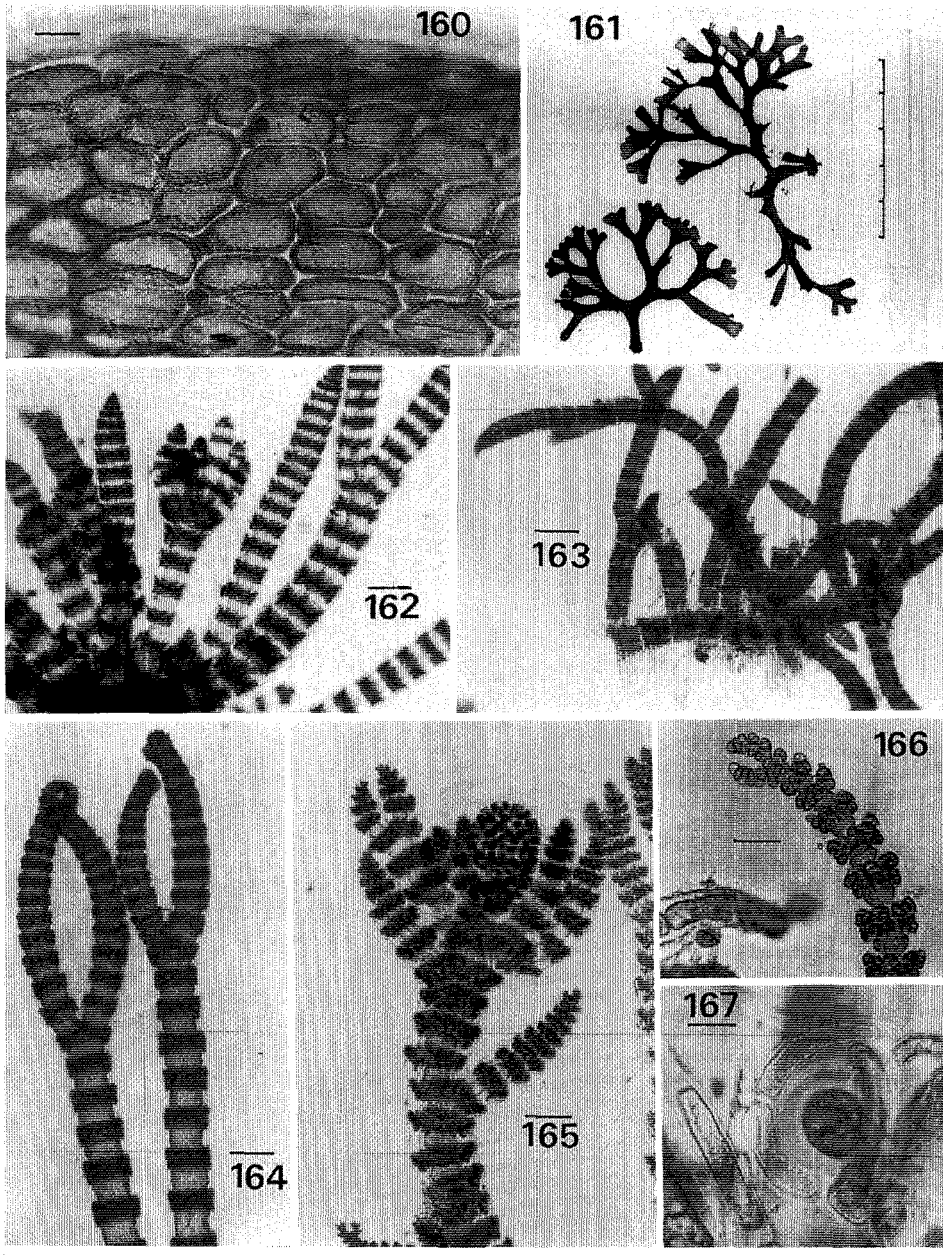

Fig. 160. *Champia parvula.* Surface view of thallus showing the two types of cortical cells. Scale = 25 μm. **Fig. 161.** *Rhodymenia divaricata.* Habit. Scale = 5 cm. **Fig. 162.** *Ceramium vagans.* Habit. Scale = 200 μm. **Fig. 163.** *Centroceras apiculatum.* Habit. Scale = 200 μm. **Fig. 164.** *Ceramium zacae.* Branch apex showing forcipate tips. Scale = 100 μm. **Fig. 165.** *Ceramium mazatlanense.* Habit showing cystocarp. Scale = 100 μm. **Fig. 166.** *Ceramium codii.* Habit. Scale = 25 μm. **Fig. 167.** *Wrangelia argus.* Nodal tetrasporangia surrounded by short-celled involucral filament. Scale = 25 μm.

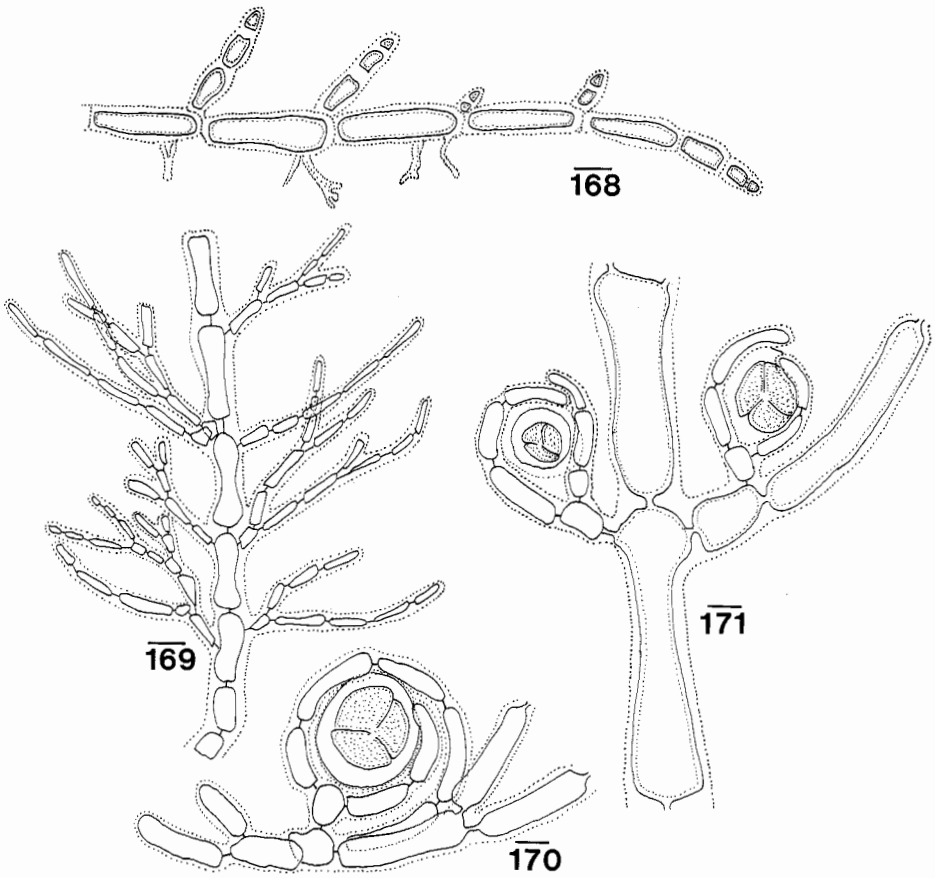

Fig. 168. *Griffithsia subcylindrica*. Habit. Scale = 200 μm. **Fig. 169.** *Wrangelia argus*. Habit. Scale = 50 μm. **Fig. 170.** *Wrangelia argus*. Nodal tetrasporangia surrounded by short-celled involucral filament. Scale = 50 μm. **Fig. 171.** *Wrangelia argus*. Detail of thallus showing nodal tetrasporangia. Scale = 25 μm.

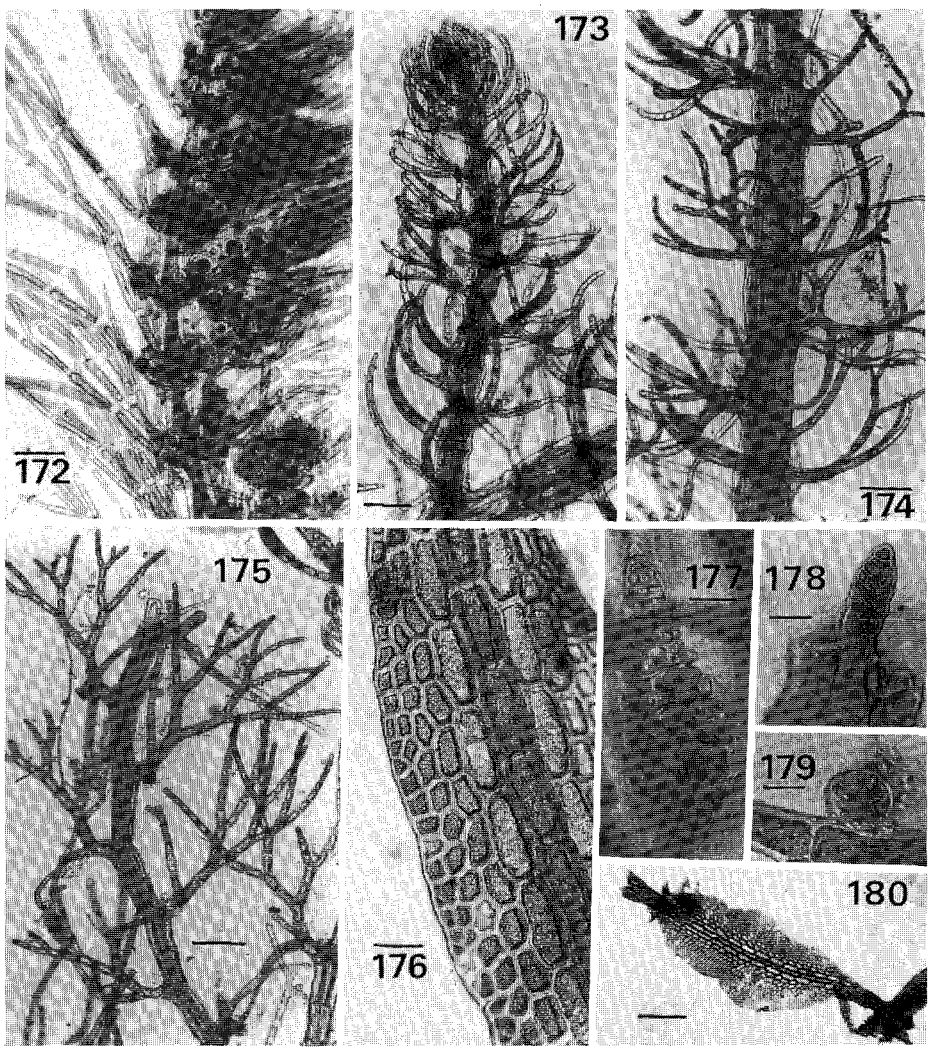

Fig. 172. *Wrangelia argus*. Habit. Scale = 200 μm. **Fig. 173.** *Heterosiphonia subsecunda*. Habit. Scale = 200 μm. **Fig. 174.** *Heterosiphonia subsecunda*. Detail of main axis showing divaricating pseudolateral branches. Scale = 200 μm. **Fig. 175.** *Heterosiphonia crispella* var. *laxa*. Habit of plant showing determinate branching. Scale = 10 mm. **Fig. 176.** *Hypoglossum caloglossoides*. Thallus showing endogenous branching. Scale = 25 μm. **Fig. 177.** *Heterosiphonia subsecunda*. Detail of pedicellate tetrasporangial stichidia. Scale = 25 μm. **Fig. 178.** *Hypoglossum caloglossoides*. Detail of regenerating thallus. Scale = 25 μm. **Fig. 179.** *Heterosiphonia subsecunda*. Detail of carpogonium. Scale = 25 μm. **Fig. 180.** *Hypoglossum caloglossoides*. Habit. Scale = 200 μm.

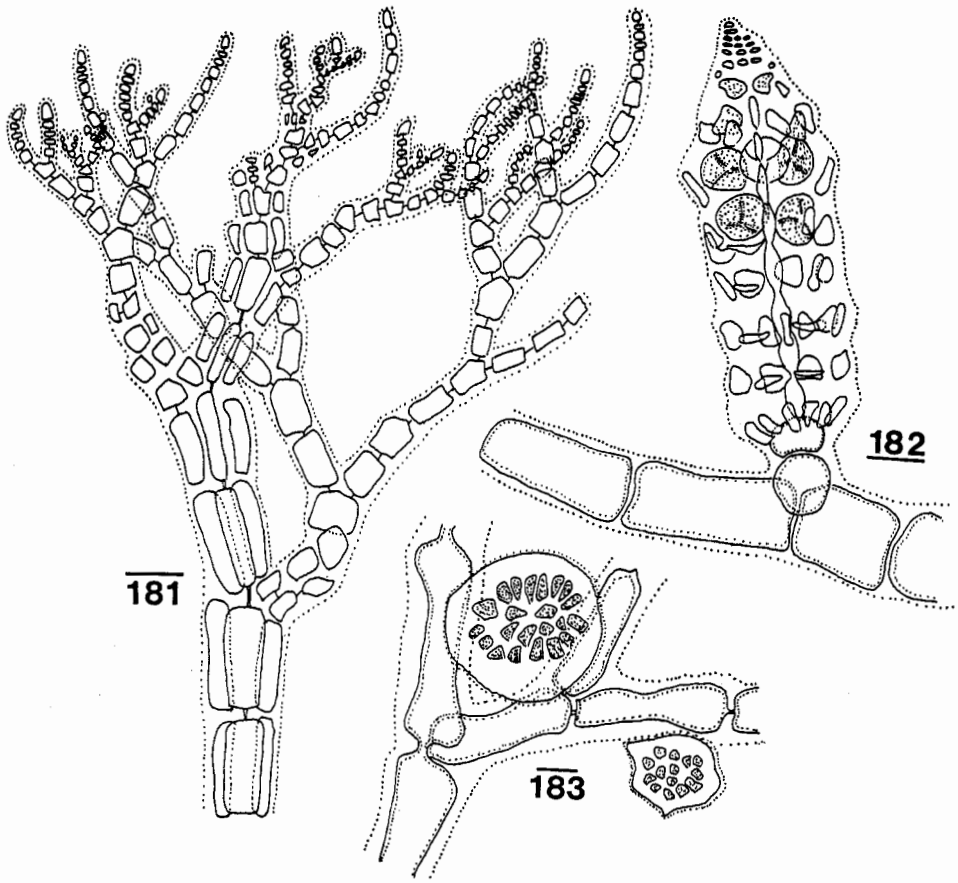

Fig. 181. *Heterosiphonia crispella* var. *laxa*. Habit of plant showing determinate branching. Scale = 50 μm. **Fig. 182.** *Heterosiphonia subsecunda*. Detail of pedicellate tetrasporangial stichidia. Scale = 50 μm. **Fig. 183.** *Heterosiphonia subsecunda*. Detail of carpogonium. Scale = 25 μm.

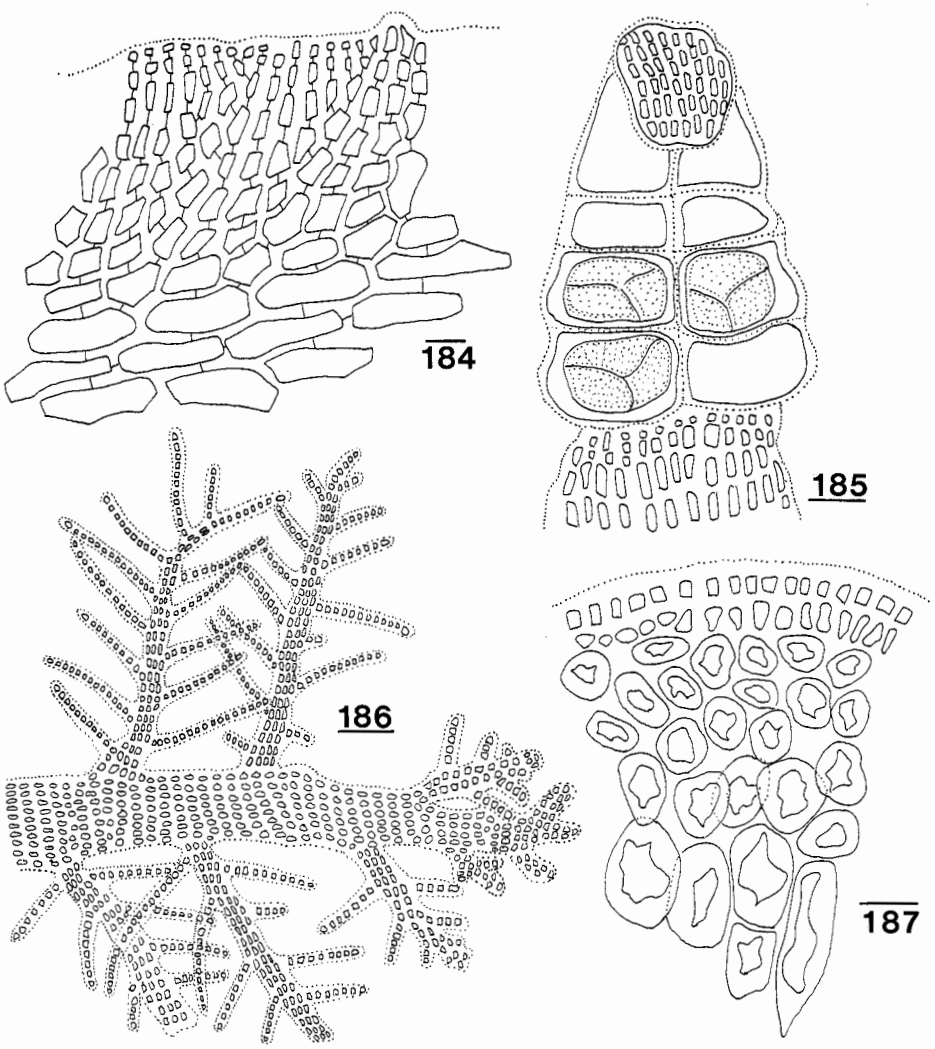

Fig. 184. *Hypoglossum caloglossoides.* Thallus showing endogenous branching. Scale = 25 μm. **Fig. 185.** *Melanamansia glomerata.* Marginal curved stichidia bearing tetraspores. Scale = 50 μm. **Fig. 186.** *Bostrychia tenella.* Habit showing pinnate branching. Scale = 100 μm. **Fig. 187.** *Laurencia venusta.* Cross-section of thallus showing lenticular thickening of medullary cells. Scale = 50 μm.

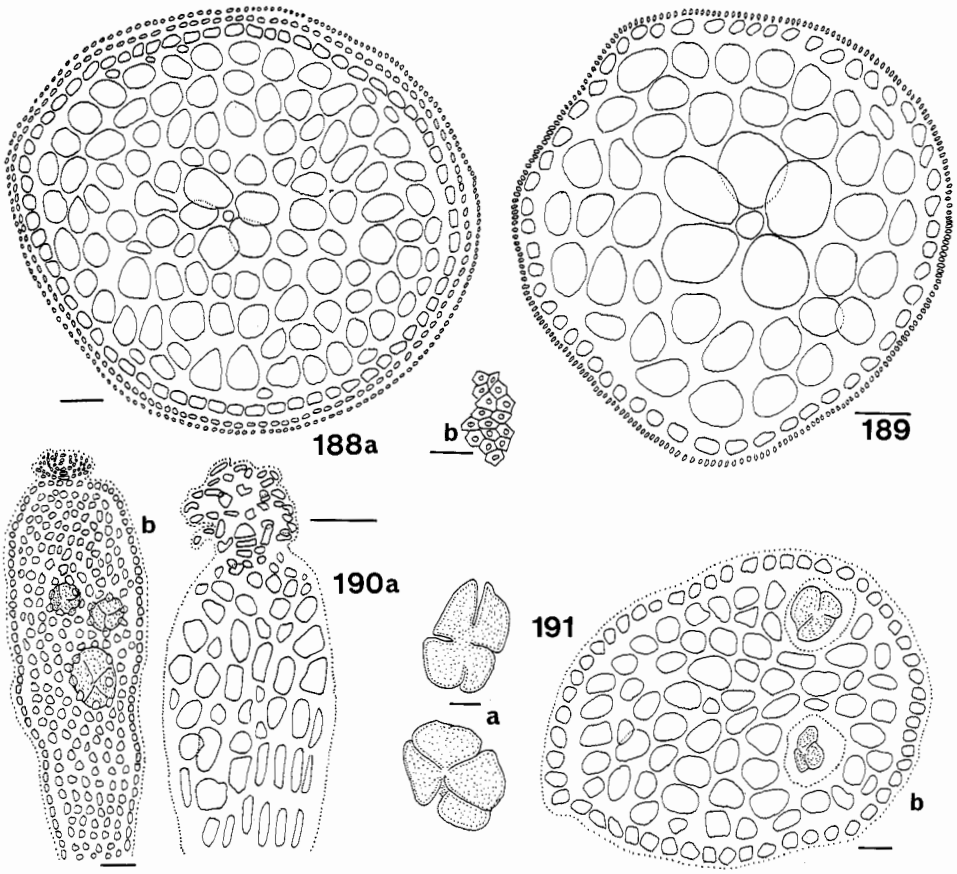

Fig. 188. (*a*, *b*) *Chondria dasyphylla*. (*a*) Cross-section of thallus. (*b*) View of surface cells. Both scales = 100 μm. **Fig. 189.** *Chondria sedifolia*. Cross-section of thallus. Scale = 50 μm. **Fig. 190.** (*a*, *b*) *Chondria simpliciuscula*. (*a*) Detail of apical region, showing apical cell and apical crown of trichoblasts. (*b*) Fertile branchlet with tetrasporangia. Both same scale = 25 μm. **Fig. 191.** (*a*, *b*) *Chondria sedifolia*. (*a*) Detail of cruciate tetrasporangia. (*b*) Cross-section of fertile branchlet showing tetrasporangia. Scales: *a* = 25 μm; *b* = 50 μm.

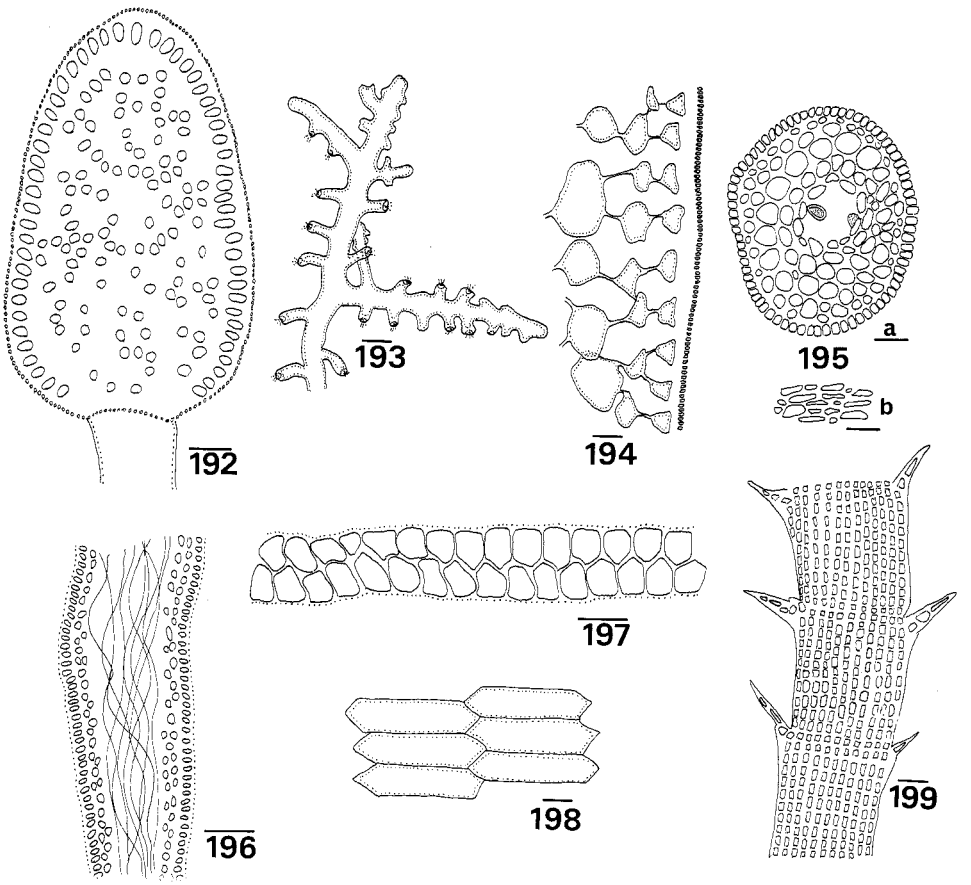

Fig. 192. *Gelidiopsis intricata*. Detail of spatulate terminal sporangia. Scale = 100 μm. **Fig. 193.** *Laurencia* sp. Habit. Scale = 3 mm. **Fig. 194.** *Laurencia* sp. Cross-section of thallus showing cortical cells joined by pit connections. Scale = 25 μm. **Fig. 195.** (*a*, *b*) *Coelothrix irregularis*. (*a*) Cross-section of thallus, showing gland cells. Scale = 100 μm. (*b*) Detail of thallus surface, showing two distinct types of cells. Both at same scale = 100 μm. **Fig. 196.** *Gelidium pusillum*. Longitudinal section of thallus showing internal rhizines. Scale = 50 μm. **Fig. 197.** *Melanamansia glomerata*. Cross-section of blade showing elongate cells in V-shaped transverse rows. Scale = 50 μm. **Fig. 198.** *Melanamansia glomerata*. Surface view of thallus. Scale = 50 μm. **Fig. 199.** *Centroceras clavulatum*. Detail of axis cortication. Scale = 25 μm.

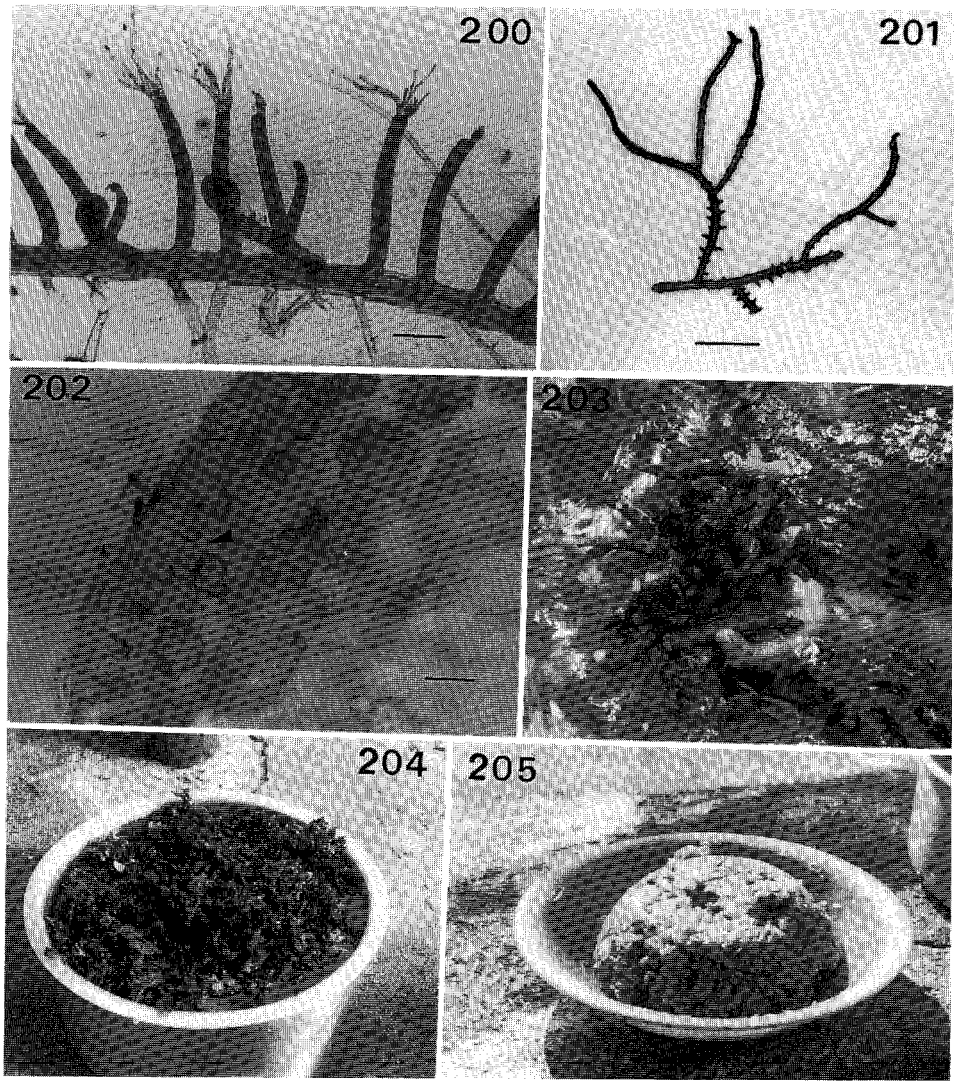

Fig. 200. *Herposiphonia secunda* f. *tenella*. Habit. Scale = 200 μm. **Fig. 201.** *Laurencia* sp. Habit. Scale = 10 mm. **Fig. 202.** *Laurencia* sp. Cross-section of thallus showing cortical cells joined by pit connections (arrow). Scale = 25 μm. **Fig. 203.** *Meristotheca procumbens*. Habit *in situ*. **Fig. 204.** *Meristotheca procumbens*. Thalli being soaked in seawater prior to cleaning and cooking. **Fig. 205.** *Meristotheca procumbens*. Cooked and seasoned pudding (*Lumie'ta*), ready for consumption.

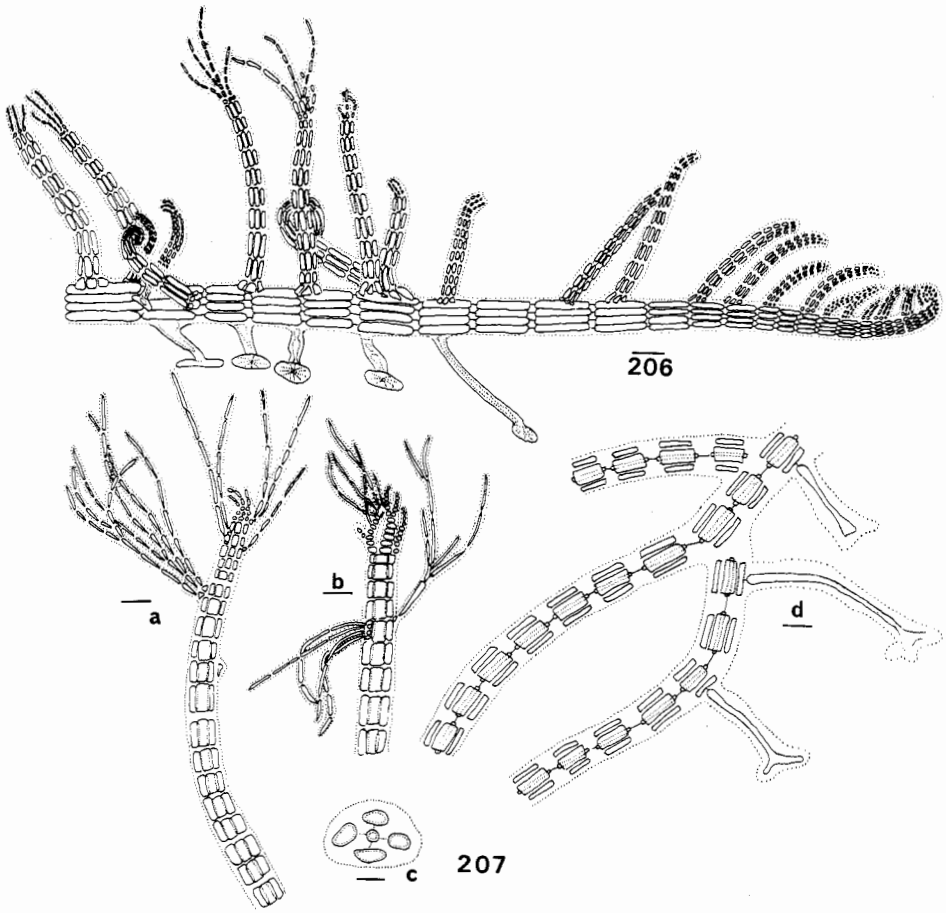

Fig. 206. *Herposiphonia secunda* f. *tenella* Habit. Scale = 100 μm. **Fig. 207.** (*a–d*) *Polysiphonia scopulorum*. (*a*) Habit. (*b*) Detail of branch showing trichoblasts. (*c*) Cross-section of thallus showing the four pericentral cells around the axial cell. (*d*) Detail of prostate axis showing rhizoids in open connection with pericentral cells. All scales = 50 μm.

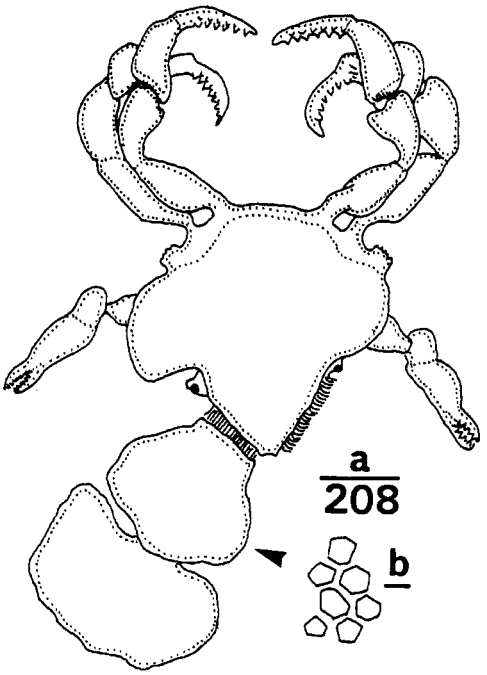

Fig. 208. (*a*, *b*) Habit of commensal crab found on *Halimeda macrophysa*. Note pronounced mimicry, including attachment of living *Halimeda* segments to crab (arrow). Scales: *a* = 3 mm; *b* = 100 μm.

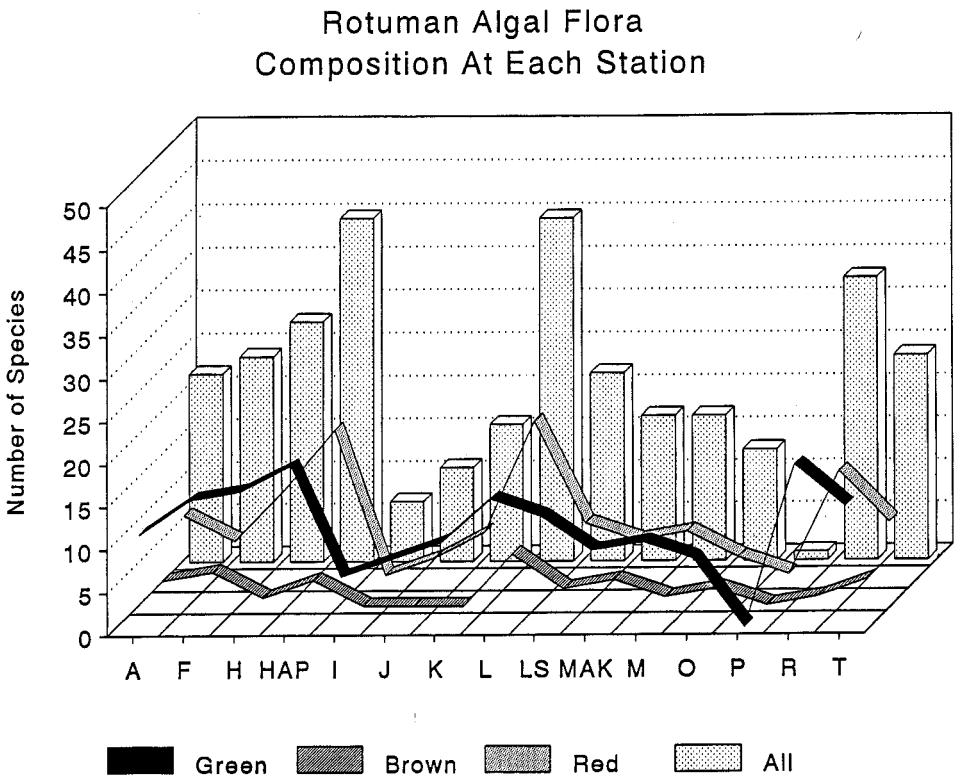

Fig. 209. Rotuman algal flora, composition at each station. F, Fapufa; H, Hoféa; HAP, Hapmafau; I, Isilepi; J, Jölmea; K, Kelega; L, Lopta; LS, Losa; M, Mea; MAK, Maka; O, Oinafa; R, Ropure; T, Tua'koi; A, 'Ahau.

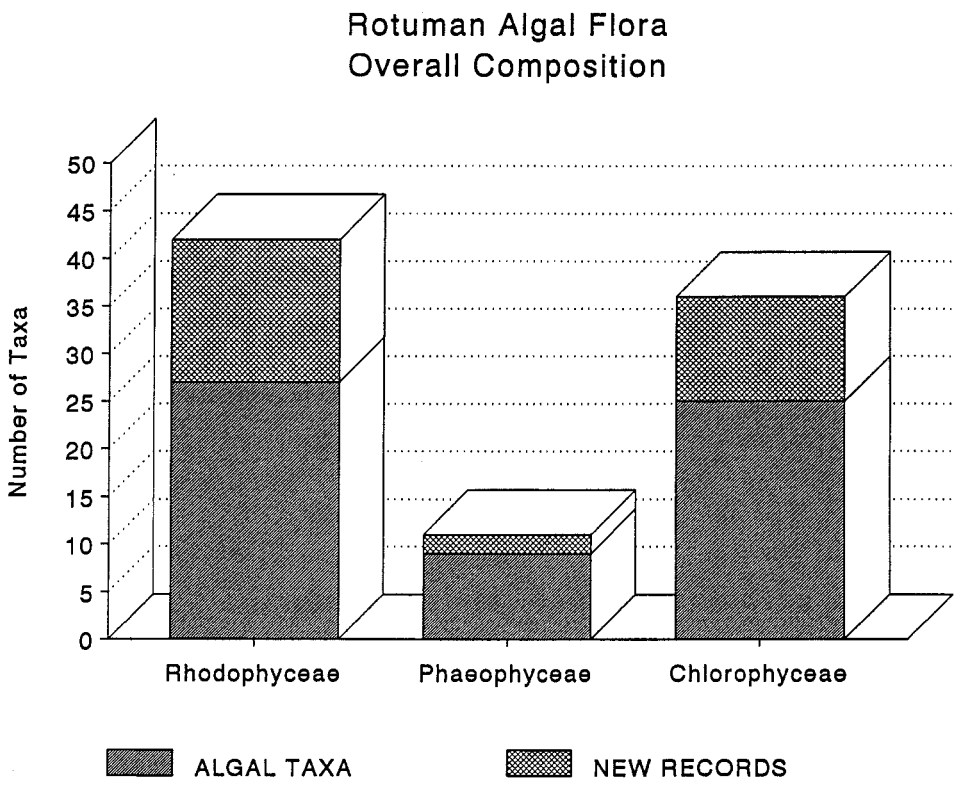

Fig. 210. Rotuman algal flora, overall composition.

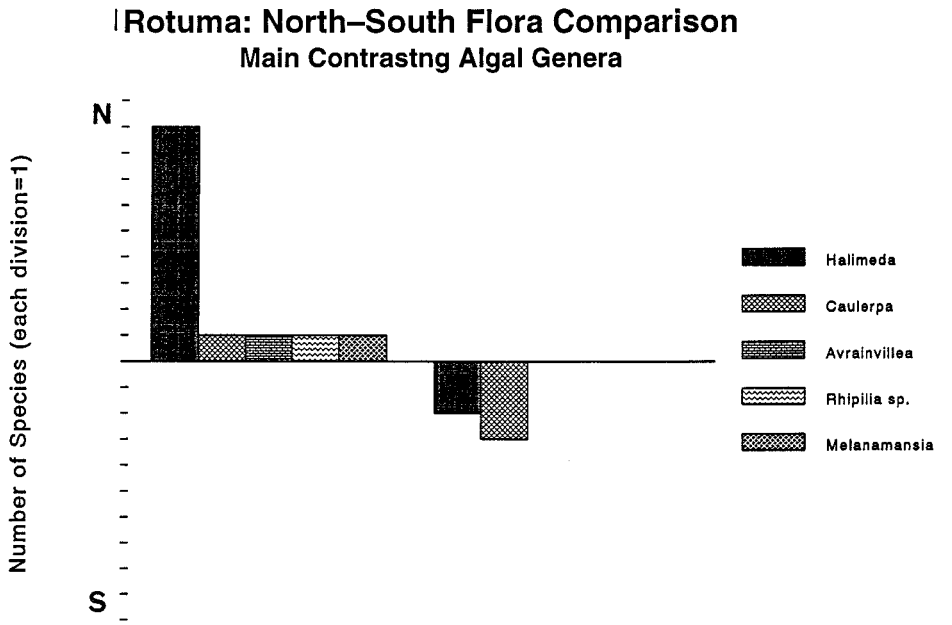

Fig. 211. Rotuma, main contrasting north–south algal species.

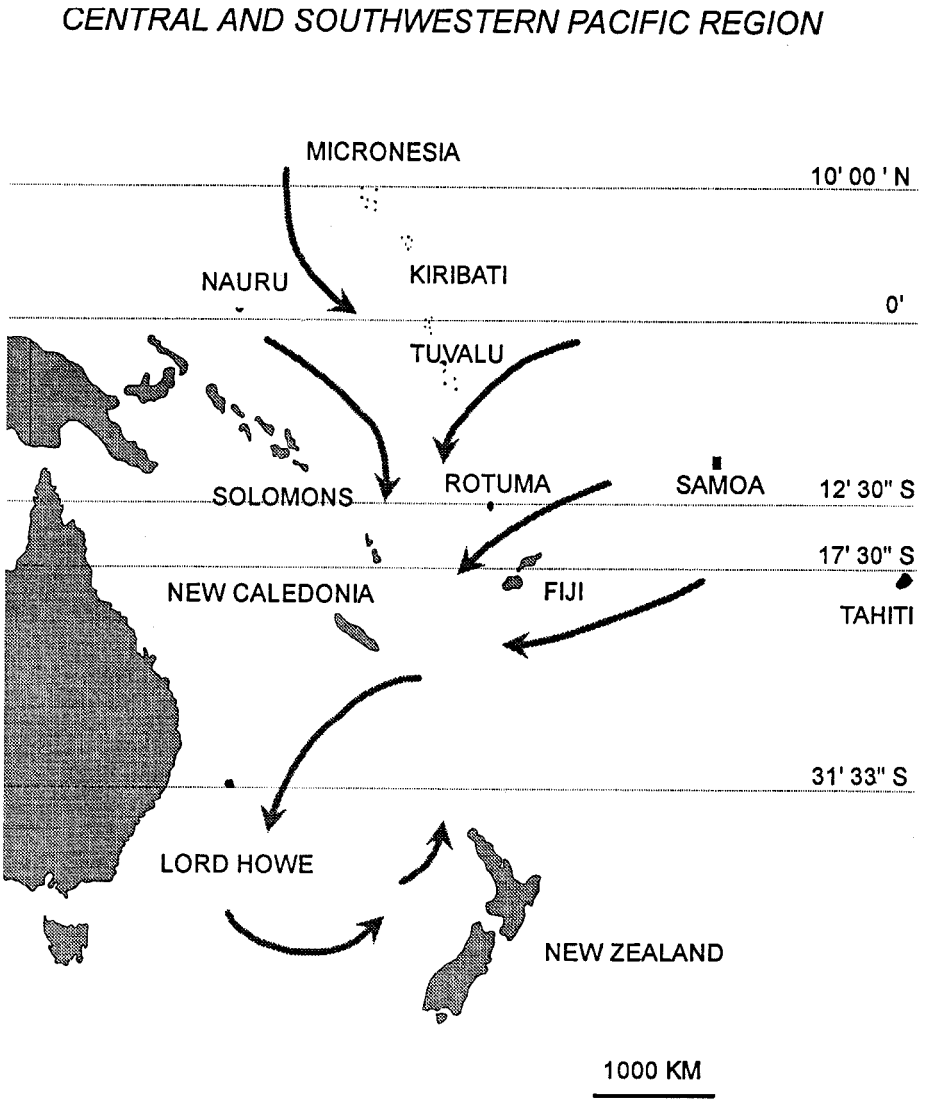

Fig. 212. Map of the tropical and sub-tropical western Pacific, showing prevailing ocean currents in January (adapted from Ash 1992).